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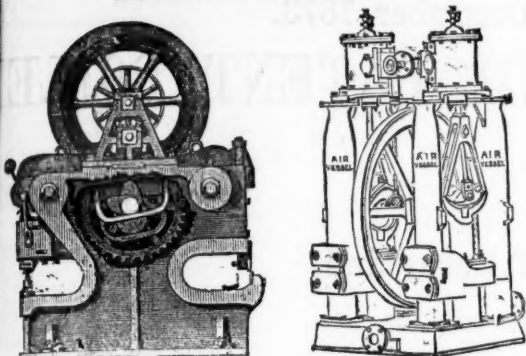
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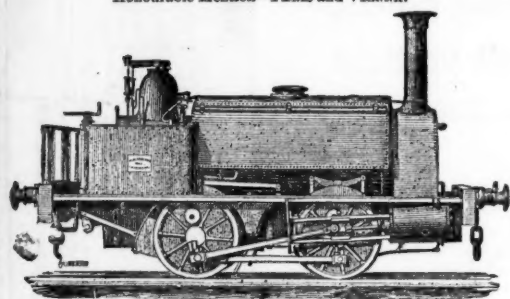
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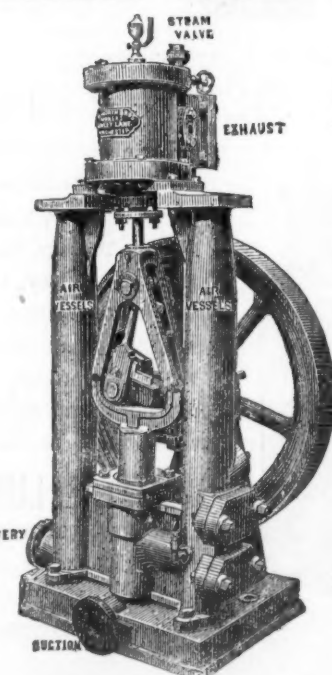
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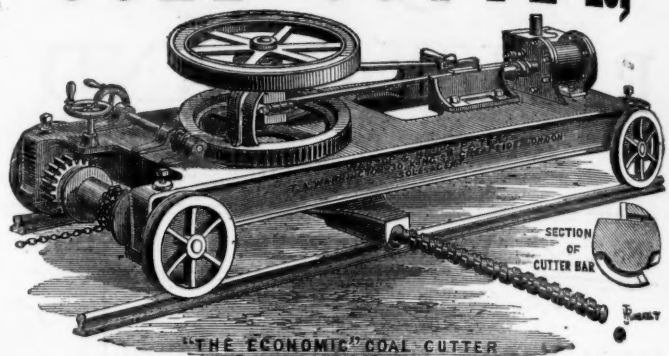
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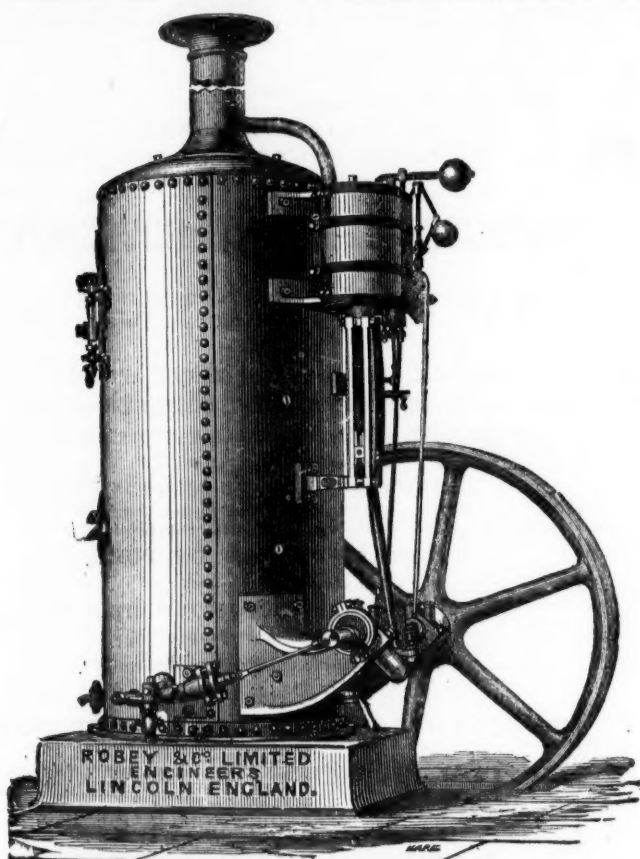
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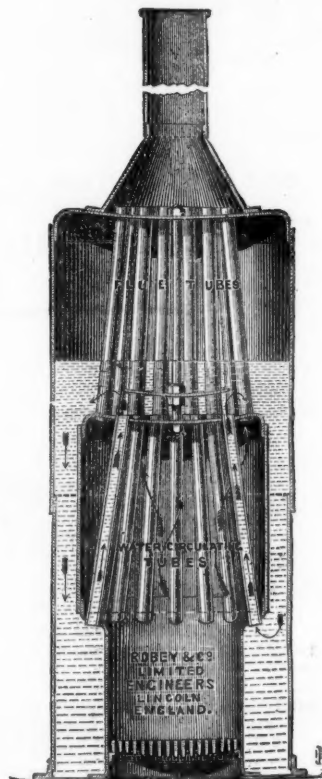
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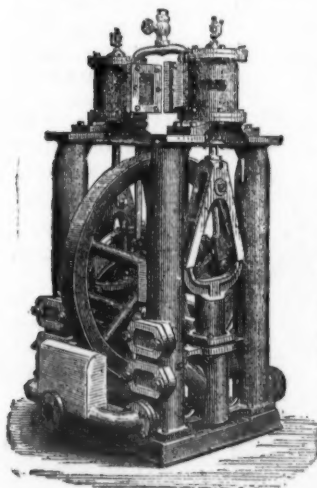


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THE IRON INDUSTRIES OF LANCASHIRE.

By RICHARD MEADE, Assistant Keeper of Mining Records,
Museum of Practical Geology.

So closely do the iron ores of North Lancashire resemble those of Cumberland, both in their mineralogical character and in their mode of occurrence, that little need be added to what already has been said of the Iron Industries of Cumberland. Whilst the Cumberland hematite, however, is for the most part a hard ore, the predominating mineral in the Furness district is a soft hematite, often containing embedded pieces of a more compact variety; much of this soft ore is used for puddling-furnaces. It is notable that many of the irregular deposits of ore in the Carboniferous or Mountain Limestone of Furness extend upwards to the level of the limestone, and stone of Furness merely by deposits of drift; from such a mode of occurrence it may naturally be inferred that the denudation which the Furness rocks have suffered has removed the upper portions of the deposits, and that the drift was accumulated upon the exposed surface of ore. Some of these mineral deposits in Furness are of considerable extent—for example, the ore worked at Park and at the Roanhead Mines forms a deposit extending for upwards of 500 yards in length, whilst its width varies from 120 to 240 yards.

As in the Whitehaven district, so in Furness, the ore is not confined to irregular deposits in the limestone, but is found also in more or less regular fissures, which generally have a north-west and south-east strike, with a dip to the south-west. Thus the mines at Stank, which are the deepest in the Furness district, are worked upon one of these fissures of hematite, dipping 45° to the south-west; this is known to extend for a length of more than 500 yards, and is in part as much as 30 yards in width. The hematite deposits of Furness were well described by Mr. P. Würzburger, in a very elaborate and exhaustive paper at the meeting of the Iron and Steel Institute, at Barrow-in-Furness, in last August.

RED HEMATITE.—The records of the Harbour Trustees of Barrow-in-Furness show that in the year 1800 there was shipped from that port 1200 tons of hematite ore; the amount, though small, will serve for comparison with the shipments of later years, that for 1849 being 146,000 tons. Mr. Braithwaite Poole, in a report on iron ore, made to the directors of the Lancaster and Carlisle Railway Company, gives the following list of mines, owners, and production of the Furness district in 1849:—

Mines.	Proprietors.	Tons.
3 Lindal Moor	Harrison, Ainslie, and Co.	55,000
3 Cross Gates	Town and Rawlinson	42,000
4 Lindal Cote	Ulverston Mining Company	29,000
3 Mouzell	Schneider, Davis, and Co.	25,000
1 Hauline	Charles Kennedy	12,000
2 Stainton	George Huddleston	12,000
1 Elliscales	George Ashburner	7,000
Total 17		182,000

The distribution of this ore, obtained within a radius of three miles of Furness, was as follows, South Wales and Staffordshire receiving the great bulk of production:—

South Wales	Tons
Staffordshire	87,000
Furness district	84,000
Yorkshire	3,000
North Wales and Salop	2,000
Scotland	2,000
Newcastle and Durham	1,000
Total 18	182,000

The selling price at Barrow at this period (1849) was 10s. 6d. per ton, the cost of transport to Wolverhampton and Tipton, in South Staffordshire, being 11s. per ton. It will be convenient here to give the production of the Cumberland mines around Whitehaven, in 1849, to supplement the information contained in our recent notice of the industries of Cumberland, amounting to 100,000 tons in that year:—

Mines.	Proprietors.	Tons.
2 Ainsworth and Co.		30,000
4 Hill and Co.		20,000
3 John Lindow		20,000
2 Tulk and Ley		15,000
2 Attwood and Co.		15,000
Total 13		100,000

In 1854 the united production of the mines of Lancashire and Cumberland amounted to 579,924 tons. Most of the mines producing this ore have since acquired a great reputation, on account of the vast deposits of ore discovered, and the high character of the metal made therefrom, more especially since the introduction of the Bessemer process, for which such iron is especially fitted. The ore raised in 1854 was distributed as follows:—To the Newcastle district, 6785 tons; to North Wales, 13,380 tons; South Staffordshire, principally by London and North-Western Railway, 300,000 tons; and by ship, coastwise to South Wales, 150,000 tons: this will show how great was the demand at this time for these ores to augment the supplies to other iron-making districts; the high percentage of metallic iron they contained, and their purity, enabling them to bear a considerable cost for carriage to distant places.

In subsequent years the production of Lancashire is separately distinguished, amounting in 1855 to 336,829 tons, the total output of Great Britain the same year being 9,553,741 tons. At this period the only works in Lancashire smelting the ore were those at Newland and Backbarrow, of Messrs. Harrison, Ainslie, and Co., at which pig-iron was made with charcoal; this iron enjoying a high reputation, being found in toughness and strength equal to the charcoal irons of Russia, Sweden, and Norway.

Lancashire, with her great resources of rich red hematite, was not destined to remain a mere storehouse for the supply of ore to other districts. Very soon many honoured names, since closely identified with her history, brought their industry, perseverance, and activity into operation, and the result was the founding of some of the best arranged smelting works in the kingdom, which for some years past have absorbed fully two-thirds of the total quantity of the ore produced in the county, in addition to considerable quantities of ore brought from other districts, and some imported from foreign countries. The production of ore has continued steadily to increase, as will appear from the following statement of quantities carried by the Furness Railways in each of the years:—

1856	Tons	1857	Tons	1858	Tons
1856	454,853	1857	458,548	1858	767,625
1859	520,829	1860	520,829	1861	871,838
1862	520,829	1863	520,829	1864	931,048
1865	607,439	1866	559,391	1867	609,077
		1868	607,439	1869	975,826

It was not till the year 1872 that the detailed produce of the mines was obtained and published; it will, therefore, be convenient to give side by side, for comparison, the returns from the mines in each of the years 1872 and 1873, as far as received by the Mining Record Office. The above-named quantities, however, correctly represent the total production of the Lancashire mines in the years named:—

Name of Mine.	1872.	1873.
Aldingham	—	400
Askham	5,718	25,881
Crossgate	23,793	25,822
Dalton (Furness Co.)	27,693	21,447
Dalton	—	21,447
Duddon, or Dunnerdale	2,105	1,650
Elliscales	18,749	20,498
Goldshire	—	120
Highfield	15,784	7,365
Lindal Moor	4,407	1,874
Lindal Moor (Harrison, Ainslie, and Co.)	153,241	153,138
Longlands	352	3,000
Martins	28,905	29,212
Moss Hall	1,500	400
Mouzell	24,174	28,302
Newton	6,300	4,339
Park	262,905	288,496
Parkside	—	1,687
Parkhouse, or Yarlside	26,191	25,323
Pennington	2,421	2,523
Pimpton	4,207	6,943
Roanhead, Askham, and Woodhead	170,769	199,017
Stainton	1,770	2,347
Stank	—	1,808
Thwaites Platt	6,052	13,246
Urwick	1,761	2,862
Urwick Little	—	6,148
Ulverston (Lindal Moor)	42,879	45,005
Whitcliffe, Crossgate, and Old Hills	10,995	16,185
Total	852,064	928,116

This gives a weekly output of ore in 1872 of 17,480 tons, increasing in 1873 to 18,760 tons. The total value of the ore raised in 1873 represents 1,219,782, or 25s. per ton, while in 1855 it varied from 11s. to 11s. 6d. per ton, and in 1868 had increased to 12s. 6d. per ton, between which date and 1873 it has increased cent. per cent. At the present time blast ore is quoted at the mines from 15s. to 16s. per ton, and puddling samples at from 20s. to 22s. 6d. per ton.

The following statement shows the proportion of production carried by the Furness railways to the blast furnaces in Lancashire in each of the years:—

1860	Tons	1871	Tons
1860	78,750	1871	602,633
1865	249,694	1872	611,992
1870	536,477	1873	662,993

The balance of production was sent out of the county by railway and ship to the following places in the years:—

Destination—Shipped at Barrow.	1871.	1872.	1873.
South Wales	46,708	41,859	50,777
Lancashire, North Wales, &c.	23,821	16,700	18,194
Scotland	4,123	5,278	4,138
Foreign parts	80	310	55
By rail.			
Lancashire, Yorkshire, and Staffordshire	176,882	173,946	198,911
Scotland	620	2,196	2,937
Stockton and Darlington districts	76,079	58,096	37,891
Total	328,210	297,085	312,833

PIG-IRON MANUFACTURE.—It is stated, on the authority of Mr. David Mushet, that the quantity of charcoal iron made in Lancashire amounted in 1839 to 800 tons, the only works existing at that period being those at Newland and Backbarrow, as previously stated, of Messrs. Harrison, Ainslie, and Co., the firm having another at Duddon, in Cumberland, where iron was exclusively made with charcoal; they still exist, and are the only remaining furnaces of the kind in the kingdom. These works remained in undisturbed possession of this industry until the year 1858, when the Kirkless Hall Company, whose works are near Wigan, blew in two furnaces, the make of pig-iron being 2840 tons, which includes the charcoal iron made in the same period. The Barrow Company, Messrs. Schneider and Hannay, commenced in 1859 with three furnaces, increasing the number in the county to seven, and the total make of iron to 26,491 tons. The Kirkless Hall Company put a third furnace in blast in 1860, in which year the make of charcoal and hematite pig was 81,250 tons. The above-named companies continued increasing the number of their furnaces. Advancing to 1866, the Carnforth Hematite Iron Company put two furnaces in blast; in 1868 the Ditton Brook Company three; and in 1871 the Furness Iron and Steel Company commenced operations with three furnaces.

The following statement of furnaces built, in blast, and quantities of pig-iron made in each year since 1865 will bring this information up to date:—

Year.	Furnaces built.	In blast.	Pig-iron made.
1865	24	16½	204,925
1866	25	19	235,880
1867	25	19	318,801
1868	28	22½	335,367
1869	30	27	436,662
1870	33	27	422,728
1871	41	34	520,359
1872	44	34½	624,041
1873	44	36	629,271

In the manufacture of hematite pig-iron in 1873 there was employed 1,020,000 tons of ore, made up as follows:—Lancashire hematite, 720,000 tons; Cumberland hematite, 128,960 tons; foreign ores, principally from Spain and Elba, 47,831 tons; and 123,209 tons made up of Cornish and Irish ores, Staffordshire Red Mine, forge and mill cinder from the puddling-furnaces, and purple ore (oxide of iron) from the metal extraction works.

The Ulverston hematite of Lindal Moor Mine was analysed in Dr. Percy's laboratory, and is thus described by Mr. John Spiller in the "Iron Ores of Great Britain," Part I., 1856:—"The sample was selected from a large quantity of ore, consisting of various degrees of hardness, the majority of which were of the hard compact variety, deep grayish purple in colour, and covered with a brownish red unctuous powder; there were also small quantities of fibrous hematite and specular iron, together with quartz and a little earthy matter." This sample contained 65.98 per cent. of metallic iron, the equivalent of 94.20 per cent. of the peroxide of iron. Another variety of ore from the Gilbrow Mine gave of metallic iron 60.55 per cent., and a third analysis obtained of the ore from Lindal Cote north pit gave 63.66 per cent. A fair average of the Lancashire hematite may, therefore, be taken as 64 per cent. The Cumberland hematite averages 66 per cent., and the foreign ore from 50 to 60 per cent., while the Cornish ores give about 50 per cent., the Staffordshire Red Mine, 36 per cent., and the Irish aluminous ores from 35 to 40 per cent. of metallic iron.

The quantity of Lancashire and Cumberland hematite used in each ton of pig-iron made was a trifle over 32 cwt., and of the ore brought into the county nearly 7 cwt., thus requiring in all 39 cwt. of ore to each ton of pig, while the proportion of coke, which is principally used in the furnaces of the district, gives an equivalent of coal of 42 cwt., to each ton of pig-iron; this includes all purposes for which coal is required, and great economy of heat is attained by the collection of the waste gases from the blast-furnaces by suitable arrangements, and these being thus utilised; the total quantity of coal employed in smelting iron in Lancashire in 1873 was 1,108,192 tons.

Of the works and companies in operation in 1873 the following is a complete list:—

Works.	Names of owners.	Furnaces.
Barrow	Barrow Hematite Steel Co. (Limited)	16
Carnforth	Carnforth Hematite Iron Co. (Limited)	6
Ditton Brook	Ditton Brook Iron Co. (Limited)	6
Furness	Furness Iron and Steel Co. (Limited)	4
Kirkless Hall	Wigan Coal and Iron Company	10
Newland and Backbarrow	Messrs. Harrison, Ainslie, and Co.	2
Total		44

The last-named firm still continue to make charcoal pig at intervals according to the supply of charcoal obtainable. The average production of the blast-furnaces in 1873 was 14,702 tons, while the proportion of the ore raised in the county, and pig-iron made, as compared with the respective production of each in the United Kingdom, was of the former 6 per cent., and the latter 8 per cent., the actual quantities of ore raised in the United Kingdom being 15,577,499 tons, and of pig-iron made in Great Britain 6,566,451 tons, the total coal employed in its smelting being 16,718,532 tons.

MILLS, FORGES, AND BESSEMER STEEL WORKS.—Twenty-three works are engaged in this branch of industry, employing in 1873 350 puddling-furnaces and 81 rolling mills, for the manufacture of bar, rail, plate, and other forms of iron.

Name of works.	Name of firm.	Situate.	Number of Puddling Rolling furnaces. mills.
Albion	Hall and Matthews	Wigan	—
Atlas Forge	Thomas Walmsley	Bolton	16
Barrow	Barrow Hematite and Steel Company	Ulverston	—
Bewsey	The Pearson and Knowle Iron and Coal Company	Warrington	40
Bolton	Bolton Iron and Steel Company	Bolton	6
Bradford	Richard Johnson and Company	Manchester	20
Carnforth	Carnforth Hematite Iron Co. Co.	Carnforth	—
Dallam	Pearson and Knowle Iron and Coal Co.	Warrington	30
Garston	Dallam Forge Company (Limited)	Garston	46
Gibraltar	Railway Steel and Plant Company	Manchester	17
Globe	John Summers	Stalybridge	6
Gorton	Manchester, Sheffield, and Lincolnshire Railway Company	Manchester	9
Hullford	Platt Brothers and Company	Oldham	8
Ince Hall	Ince Hall Rolling Mills	Wigan	—
Mersey	Mersey Steel and Iron Company	Liverpool	—
Moss Side	Dallam Forge Company (Limited)	Wigan	31
Openshaw	The Ashbury Railway Carriage and Iron Company (Limited)	Manchester	43
Park Bridge	H. Lee and Son	Ashton	4
Pendleton	William Barningham	Manchester	20
Pendleton	Maybury, Matthews, and Company	Pendleton	8
Preston	The North of England Carriage and Train Company	Preston	35
Star	The Star Iron Company	Stockport	7
White Cross	White Cross Wire Company	Warrington	—
Total of county			350

In addition to these mills and forges, there were five works engaged in the production of steel by the Bessemer process, of which the following is a list, with the number and capacity of the converters:—

Works.	Firms.	No. Capacity.
Bolton	Bolton Iron and Steel Company	4 6 tons.
Barrow	Barrow Hematite Steel Company	13 6 "
Carnforth	Carnforth Hematite Iron Company (Limited)	2 6 "

Gorton Lancashire Steel Company 4 6½ t.
Gibraltar The Manchester Steel and Railway Plant Company, Newton Heath 4 3 "
Mersey Mersey Steel and Iron Company 10 5 "

The quantity of coal used in the above-named works, estimated from an average of several important returns, shows the consumption in 1873 to have been about 330,000 tons.

METAL EXTRACTION WORKS IN LANCASHIRE.—This industry, in which some 20 extensive firms exist in various parts of Great Britain, is directed to the extraction of copper from copper pyrites imported from foreign countries—the sulphur having been first separated at the chemical works, and the residue sold as "burnt ore" to the works in question—and operated in 1873 upon 323,910 tons of burnt ore, from which 12,810 tons of copper was extracted. The residue, known as "purple ore" (oxide of iron), is a valuable product, furnishing a setting material for puddling-furnaces; it is also used in some blast-furnaces, as at Ditton Brook, near Warrington, and others in the county; this residue is in great demand, and contains a considerable percentage of metallic iron, Mason's pyrites giving 67 per cent., Tharsis 62 per cent., and Buitron 66 per cent. The following works and firms in Lancashire operated on the quantities of burnt ores noted against them in 1873, and yielded 275,000 tons of "purple ore":—

Works.	Name of firms.	Burnt ores.
Widnes	N. Mathieson and Company	8,700
Ditto	Widnes Metal Company (Limited)	20,200
Ditto	Tharsis Sulphur and Copper Company (Limited)	126,000
Saint Helen's	Duncan McKechnie	11,240
Manchester	Newton Heath Reduction Company	5,700
Bolton	Harrison, Blair, and Company	1,200
Ditto	William Haslam	1,500

* This includes what was used in the other works of the firm at Birmingham and Glasgow.

A notice of the iron industries of Lancashire would be incomplete without a reference, though general, to the Barrow Shipbuilding Works. This establishment commenced operations in 1871, and though not so favourably circumstanced as similar works on the Tyne, Wear, and Clyde, having to import to a great extent the ship and boiler-plates from Durham and Scotland to furnish materials for carrying on the works, yet they have been most successful in their operations, having in the few years of their existence constructed nearly 30 vessels of varying tonnage, and thus largely contributing to the maritime commerce of the Empire.

In conclusion, we may mention that during the past year a considerable expansion has taken place in many of the ironworks of the district. The North Lonsdale Hematite Iron Company have erected two new furnaces at Ulverston, and the Carnforth Company another, in addition to their new works for the manufacture of steel, fitted with all the necessary mechanical appliances.

The iron industries towards the close of 1874 were not so actively employed as their resources would admit of. The Bessemer works may be excepted, they having a fair share of work on hand. Great hopes, however, are entertained of a revival of trade this spring, as the demand for the Bessemer pig is steadily on the increase.

MINING IN QUEENSLAND.

SIR.—The yield of tin continues steady, as shown by the receipts, for the month of November, at the Warwick Railway Terminus—461 tons 5 cwt. 3 qrs. 10 lbs. stream tin, ingot tin *nil*. If we are to judge from the absence of ingots in these receipts the smelting on the field does not, as yet, appear very successful. The direct shipment to London since my last has been one ship only—Nov. 27, Pekina, with 86 tons ingot tin. There are three other ships loading, two being nearly ready for sea, and having a fair quantity of ingot tin on board.

The high price of copper is urging the copper mines of the colony to the fore. It is expected that the Peak Downs Mine will pay a dividend of 20 per cent. on the half-year, and the Mount Perry Company 15 per cent. on the half-year. The Dee Mine is being worked full-handed and with vigour by the new proprietors. The Mount Clara has changed hands for 5000l. The Normanby is again "knocked," and in the market, it can be bought for 10,000l. or 12,000l. The New Moonta, a new mine within 50 miles of Bundaberg, is offered on very easy terms to a few local capitalists. Other copper mines are constantly spoken of as having been let on tribute, or offers to work having been made, and there are many splendid copper mines that have been sufficiently prospected and opened up to show their value that can now be purchased in fee for 1000l. to 5000l. Capitalists should send out trustworthy experienced men to inspect some of these mines, there is a good opening for them here at present. The Palmer gold field is improving month by month; the export of gold from Cook Town during the month of October was the largest yet, while it is expected that November will exceed October by 2000 to 3000 ozs. At the lowest depth yet attained in Gympie—546 feet perpendicular—splendid gold was struck last week in a quartz reef. This will alter the workings very considerably on this field, and encourage the investment of money in deep sinking.

Brisbane, Dec. 8. RESIDENT.

FULLER'S REEF GOLD MINING CO., NEW SOUTH WALES.

TO THE CHAIRMAN.

SIR,—In noticing the report of your London meeting of shareholders of the Fuller's Reef Gold Mining Company, as given in the European mail, it struck me from the tenor of the proceedings that are described as having taken place there at the time that the board of directors and shareholders were alike ignorant upon the actual prospects of the mine and value of the whole property. Having with much regret perceived the same, I thought it probable that you would not object to hear a few unbiased remarks bearing upon the value and prospects of the property.

As one thoroughly acquainted with the reefs and works of the different sections held by the English company, from the fact of having been accredited with the charge of the whole property for upwards of twelve months, up to the time of the present company taking delivery, I, being totally disinterested, can refer to the property in an entirely impartial strain of mind, without leaning in any way out of the real course, but base my statements simply upon facts and experience while working the mine. Taking it for granted that your representatives here in Sydney have already furnished the current information, I will make my observations as brief as possible, merely endeavouring to show the opinion and views of the practical miner.

In following the chart I had the honour of preparing specially (as I was led to understand) for the use of the directors in London, it will at once be noticed that there is no lack of quartz at hand, in fact, the vein is laid bare and stripped nearly the whole length in the long tunnel lowest level, which measured 890 ft. in January last, when I gave way to the officials appointed by the English company, and running from 3 to 4 ft. in width, and would, if stopped, produce thousands upon thousands tons of quartz. It was from this tunnel the parcel of 20 tons (whereof part was crushed in England) was broken down, and, as results have proved it, beyond doubt was of very poor stone. The level this stone was taken from is and was always looked upon by myself and working party as one of a very poor quartz, but the adit in itself was, as a medium for opening out the mine for effectual work, a valuable improvement, and while much highly auriferous ground has been worked above the level in question, it was natural to speculate upon the likelihood of meeting equally or even far richer stone at a greater depth.

At the time of my giving up charge of the Fuller's Reef Company's property, I looked upon the putting down of two or more shafts from the long tunnel at lowest level to prospect the ground below at a greater depth, as one of the most important steps to be taken by the new company, so as to satisfy itself as to the real value of the mine, and solve the problem of what character the reef may be found at a lower level, where, for all that is known, immense rich stone may await the result of the enterprise to be got at to prove the value of the Fuller's Reef, and make the company's property dividend paying; this may be argued as hazardous, but, nevertheless, if the reef is to be worked with judgment, this is at present wherein the greatest prospects rest, and ought to be the first work done. To my great surprise I learnt the other day that no such attempt has yet been made; in fact, the mine is, so to speak, exactly

in the same state as 12 months ago, when I delivered it over to the representatives of the Fuller's Reef Gold Mining Company, no progress has been made by sinking into the unknown level below to ascertain what the reef really is worth. If you would permit me to make a suggestion it should be to satisfy yourself upon this point, and pending the result, defer all future operations of the company on the Fuller's Reef. I trust I may not be considered intrusive in venturing to forward you the above particulars originating from a genuine motive, and wishing to see that work performed which is the only course to lead to success, and to reclaim the former reputation of the Fuller's Reef as a payable mine. VICTOR NISSEN.
Sydney, New South Wales, Nov. 26.

Assay Offices and Ore Floors, London, E.C., Jan. 29, 1875.
CERTIFICATE OF ASSAY.

For the Fuller's Reef Gold Mining Company (Limited).

We have crushed, mixed, and carefully assayed the parcel of quartz, &c. Nineveh, and find the following to be the result:—

Mark of parcel.
F.R. 45 bags { Produce of gold, 1 oz. per ton of 20 cwt. of ore.
F.R. 42 bags { Ditto silver, 1/2 oz. ditto.
F.R. 45 bags { About 5 tons. JOHNSON, MATTHEY, AND CO.

CAPE COPPER MINING COMPANY.

SIR.—A "Looker-On" is most kindly taking a vast deal of trouble to prevent persons investing in this mine. He cannot be a shareholder, for upon his own showing he would be crazy to hold shares at their present price, so that his disinterestedness is all the more remarkable in thus spending so much ink on a matter in which he has no concern. When, however, he draws an unfavourable deduction from the lower percentage of a portion of the ores now being brought over, he forgets that this is due to their having been extracted from the immense heaps of waste ore which have hitherto been looked upon as worthless, and which have only very recently been made available by means of the new dressing machinery lately supplied. These low percentage ores are, therefore, not any indication of failing dividends, but a clear increase to the profits hitherto reckoned upon. I have no desire to bolster up the value of these shares, but I do not wish to see them unjustly depreciated, as I take a great interest in this mining company, not for speculative purposes, but because I am fortunate.—
London, Feb. 9. AN ORIGINAL SHAREHOLDER.

CAPE COPPER MINING COMPANY.

SIR.—The directors having issued their progress report for December, by which it will be seen the increased yield of 200 tons from the principal mine (Ookiep) has been steadily maintained; that the last sale, on the 9th inst., realised the round sum of 15,600*l.*, being 16*s.* 8*d.* per unit, or 26*l.* 11*s.* 6*d.* per ton; and that 900 tons of copper ore have been put forward for sale on the 23rd inst.—all of which facts appear to me very satisfactory indeed. With reference to the low produce of a part of the ore sold on the 26th ult., I have looked attentively over the monthly reports issued by the directors for last year, and as I have failed to see the produce of any month's yield less than 30 per cent., I conclude the low-produce ore—25 to 23*l.* per cent.—sold was a portion of the refuse ore, to which attention was invited in my letter of Dec. 31, and which I am rejoiced to see the company is now bringing forward for sale; and as these refuse heaps (or "accumulations," as they are styled in the balance-sheet) comprise enormous quantities, and may safely be estimated at hundreds of thousands of tons; and as similar refuse heaps in Chili have been turned over three or four times, and still have a profit on the outlay, the dressing of the heretofore neglected refuse ore heaps at the Cape Copper Mines must be a source of considerable profit, and eventually have a very important effect on the financial affairs of the company.

As an enquiry has been made whether I doubt the ore ground will hold below the 80 fm. level, and as I do not profess to be a mining engineer, and have not as yet perfectly reliable data before me as to the exact quality of the ore likely to extend down to the 80 fm. level now being driven, I think it better to defer giving an opinion until we are in possession of Mr. Tonkin's annual report, a copy of which will probably be in our hands next month. Meantime, perhaps it would not be uninteresting or unprofitable to glance at the depths the principal mines in Chili are being worked, the average produce of which is only about 13 per cent. The Pike (or Pique) Mine, in the Tomaya district, has its lowest level at about 260 fms. from the surface, and the lowest level of the Carrizal Mines is at a depth of 270 fms., and from which mines from 8000 to 10,000 each of fine copper (or nearly a moiety of the entire yield of all the Chili mines) is obtained; and although the richness of both mines has diminished in the lower levels, still large profits annually are the result. The cost of extraction is very great, being about 60 per cent. on the annual production, to which must be added the cost of transport by mules to the railway, and thence by railway to the shipping port, and where the merchant has to contend with an export duty of 5 per cent. In a country where skilled native labour is value for a dollar a day, and every day getting more scarce, I cannot well see how the Chili mines, which have been worked from time immemorial, with a diminished produce and ever-increasing expenditure, can hold their own with the Cape Copper Mines when they have been fully developed, yielding ore of more than double produce, and which mines are not half the distance from England; and who will have in the course of this year a railroad of their own from the mouth of the mines to the wharf of the shipping port along the jetty, off which two large vessels can be loaded at the same time; who will have no costly mule carriage over bad roads to pay, and where skilled native labour can be had in abundance at 1*s.* 6*d.* per day. AN INVESTOR.
London, Feb. 12.

THE MINERAL RESOURCES OF CANADA.

SIR.—Although recent litigation has proved that the petroleum resources of Canada are decidedly less important than has been represented, I do not think Canadians generally have any reason to regret that the whole facts of the case have been so thoroughly investigated. The misrepresentations were not made by Canadians, and it has been demonstrated that so jealous were they of the honour of their country that a sufficient number of subscribers of \$1 each could be found amongst a very small community of them to provide the necessary amount to send a telegram across the Atlantic to prevent the exaggerated estimate of the riches of Petrolia leading the capitalists of England to incur loss. Indeed, the litigation may be useful to the Dominion if it be only by attracting attention to it, for I am sure that if English capitalists would take a little more interest in Canada they would find it a profitable field for investment, and would at the same time confer permanent benefit upon one of the most important territories under the British Crown.

Hitherto Canada, under which designation I include Nova Scotia and Newfoundland, has been comparatively neglected by Englishmen, although there are gold deposits which would yield a large profit if developed, copper mines richer than any in Cornwall, plumbago deposits equalling, if not surpassing, those of Siberia, and much more readily accessible, an abundance of mineral fuel, and everything to ensure prosperity except working capital. Hitherto working capital has not been forthcoming, the one or two Canadian concerns which have been established having failed to obtain capital, and having been compelled in consequence of their thus dependent position to appoint men not fit to be entrusted with the management of the concerns over which they have been placed. The little reliance to be placed in the reports of English engineers sent out to Canada is evidenced by the encouraging report given by a man of so high a character as Mr. Hay upon Canadian property proverbially poor, the effect of which Canadians consider to be more prejudicial to their best interests than the condemnation of their most valuable properties as worthless. The one shakes confidence in the resources of the Dominion, the other merely delays the subscription of capital.

It is, perhaps, difficult to suggest a remedy for this position of affairs, yet I cannot help thinking that if the Canadians were to form a DOMINION MINING CORPORATION, formally sanctioned by

the Legislature, and so constituted that no purchase-money could be charged for the concessions, and as payments made to directors or managers, except out of profits, the necessary capital could at once be raised by the sale of the shares in this country. The idea may appear Utopian, but this will only be until the details have been considered. Let a corporation be chartered by Act of Legislature, with a nominal capital of 2,000,000*l.*, with the right to work any Crown mining property not already conceded upon payment of 10 per cent. upon profits as royalty to the Crown, the corporation being likewise authorised to undertake the development upon the same terms of mining property of acknowledged value belonging to private individuals. The board of management should be appointed by the Legislature in the first instance, and each year the members of the board re-appointed, also by the Legislature, from amongst the retiring board and those nominated by the shareholders. Thus, supposing the first board to consist of nine members, these would retire at the end of the first year, at which time the shareholders might, if dissatisfied with the exertions of the nine who have been in office, nominate nine others. The Legislature would then select nine out of the eighteen to continue in office. As those in power would not be replaced without just cause, the reason for removing them would have to be discussed at the meeting of shareholders, and the Legislature would then judge between the shareholders and the old board. The Government Inspector of Mines would be the professional representative of the Legislature.

Secretary and clerks, engineers, mine captains, &c., and miners, would be paid as by a private company, but the board of management would receive no remuneration except out of profits. Of the profits realised 10 per cent. would go to the Government or mine-owner, 10 per cent. to the board of management, 5 per cent. to form a depreciation fund for the replacement of the machinery and plant, 15 per cent. for the development of new properties, and 60 per cent. for dividends on the shares. There would be no difficulty in placing 2,000,000*l.* worth of stock of a corporation thus constituted, and assuming the earnings to be 10 per cent. (which could very readily be realised), the shareholders would receive 6 per cent. the first year, and there would be 30,000*l.* for developing new properties, so that in five years the dividends would be doubled, and they would go on gradually increasing until the return to the capitalists who provided the original 2,000,000*l.* would be enormous. ACTUARY.
Pall Mall, Feb. 9.

RICHMOND CONSOLIDATED MINING COMPANY.

SIR.—Is it true that, besides other drawbacks and difficulties against which this apparently successful mine is now labouring—but which are not brought to the light of day—there has been for some time past (and still is) the serious drawback of there being no buyers of the bullion when produced—that is to say, that there is no ready market for it in America? If this be so, the declaration of the dividend must be delayed, and the amount diminished.
Feb. 10. MEMBER OF THE STOCK EXCHANGE.

CHEMICAL METALLURGY—NASCENT PROCESS.

SIR.—In a letter dated Jan. 20 which appeared in the Supplement to the Journal of the 23rd, I asked Mr. Emmens six questions relative to the produce and value of the arsenical pyrites being treated at the West of England Company's Works, Calstock, to which, as an intended investor in the company, I expected that gentleman would have replied. As no notice has been taken of the questions referred to, possibly Mr. Emmens will not object to give some information regarding the arsenic, copper, and silver only, which, as stated in the prospectus, is now being extracted from 500 tons of pyrites per month at a profit of 4*l.* per ton.

The respective weights of each of the metals contained in the quantity of ore being treated per month as per statement are—Arsenic, 153 tons; copper, 19 tons 2 cwt.; and silver, 2750 ozs.: value together, at the prices given, 3533*l.* Now, from actual results obtained from working this quantity of ore per month, are the respective weights of each of the three metals named really produced in a separate and marketable state, and of the value above named? and, if not, how much, and what value, of each metal is got from every ton of ore worked? These questions are as simple to answer as they are important for an intended investor in the company to know, and if Mr. Emmens declines to give this information I have no further remarks to make, but shall leave the matter for the investing public to decide whether or not such a large capital is likely to be subscribed for a purpose of which no one but the vendor appears to have, or are likely to get, any knowledge. Meanwhile, till these questions are satisfactorily answered, no doubt Mr. Emmens will admit that both the 29-52 per cent. of iron and 18-10 per cent. of sulphur are of little or no value for any purpose.
Birmingham, Feb. 10. SMELTER.

ROCK DRILLS.

SIR.—The communication of a "Constant Reader" in the Supplement to last week's *Mining Journal* is scarcely fair to miners, although I quite agree with him that the rock drill is a very useful and valuable invention. The "prejudice and astonishing conservatism" to which "Constant Reader" refers has much less to do with the introduction of machine drilling than the question of economy. Let it be shown that sinking or driving can be done at a lower price per 100 fms. with the machine drill than by hand labour, and they will be at once be introduced. I suggest that the estimate should be made at per 100 fms. instead of at per fathom, because every man of business knows that if a steam-engine (and a rock drill is but one form of steam-engine) be purchased it will only repay itself if it be given work to do, and plenty of it. It is not economic to buy a steam-engine to pick one's teeth with, and if a locomotive were constructed, and only used to make one journey a year from Plymouth to Penzance it would never repay the outlay; and so it is with rock drills. When we have a fathom to drive here and a fathom there rock drills are very expensive playthings, and we shall find the cost per 100 fms. much greater with the machine drills than by hand labour.

But there are innumerable cases both in Cornwall and in Wales in which the purchase and use of a machine drill would be very economic, and I will endeavour to explain how this economy is to be secured; it is by fair liberality to the working miners, and by the education of the mining captains. From my experience I am inclined to maintain that the working miners are much more intelligent as a rule than the mine captains, and it is to this fact that I attribute the excellent reputation enjoyed by Cornishmen in foreign countries as mine managers, and the ignorance of the mine captains in Cornwall. I have usually found that both Cornish and Welsh mine managers are men who have by mere luck got into their positions, and thereafter they depend more upon trafficking in shares more than upon their salaries for their remunerations, and thus they grind down the wages of the working miners to make it appear that the mine is more profitable than it is, the result being that the property is ruined by being worked at a low price instead of economically.

A rock drill ought to do 250 fms. of drilling before being disabled, and allowing for putting four holes in the face or platform before blasting, this would represent 60 fms. extension—that is to say, the shaft could be sunk 60 fms. or the level driven 60 fms. before the drill is disabled. Suppose this is in ground that would be set to six men at 5*l.* per fathom (the harder the ground the better is the comparison for all machine drills) the cost would be 300*l.*, and the time required letting the men earn the present rate of 5*l.* per man per month would be 10 months. Six fathoms per month would be considered good work in ordinary ground—such as is met with in Cornish and Welsh mines. But the machine drills at the Hoosac, St. Gothard, and elsewhere have averaged 10 ft. per day, or 50 fms. per month. As I propose the use of one drill only, I will assume this to be reduced to 20 fms. per month, and I would give each working miner 7*l.* 10*s.* per man per month instead of 5*l.*, or if the 60 fms. be wrought in less than three months, I would give each man the 22*l.* 10*s.* for the shorter time. I believe work would be done in little over two months, but allowing three months I should effect considerable economy as compared with hand labour.

As I allow for the disabling of the machine with so little work, I

take McKean's drill at 35*l.*, as advertised in last week's *Journal*, a compressor at 90*l.*, and add 20*l.* for power tubing and all other accessories, making 145*l.* for the whole, which is excessive, but I wish to give every advantage to hand labour. Then I pay my six working miners 7*l.* 10*s.* per man per month, or 135*l.* for the three months' work, and thus get 10 months' work, which would cost agency, coals, pumping cost, &c., and am 20*l.* to the good into the bargain. All this could be done by sharing the advantage with the working miners; but as long as we have the present class of mine captains we shall neither prosper nor prosper in Cornwall nor rock drills to lighten the labour of.—
Wheat Prussia, Feb. 9. A WORKING MINER.

CAUTIONS TO PATENTEES.

SIR.—With your kind permission, I am very anxious to offer a few words of caution to all patentees who wish to secure the fruits of their labour, and I will come at once to the point by saying that there is no greater delusion or snare than the ordinary so-called six months' "provisional protection." The common belief is—and I have had the greatest possible difficulty in convincing many of my friends otherwise—that an inventor by taking out a provisional specification has absolutely six months before him to complete his experiments, and obtain his final specification sealed. This, however, is not at all the case. The facts are these. Suppose that Brown has hit upon some useful mechanical invention, or has discovered a way of treating certain substances otherwise useless by the adaptation of certain chemical processes, and at the end (say) of October secures provisional protection. But Jones has also been struck with the same idea, and he does not apply for protection till the end of December, or two months after Brown, but, being satisfied as to the value of his invention, he gives "notice to proceed," completes his final specification, and gets it sealed with as little delay as possible, while Brown, on the other hand, feeling sure that he is safe for six months, does not trouble himself to hurry. Does priority of application for protection then secure Brown? Certainly not. Jones comes into court with his parchment document sealed, and Brown can only obtain anything that Jones does not happen to have got. Nay, more, if Jones has any idea that Brown's patent is of a similar character, when he (Brown) gives notice to proceed, Jones may prevent his getting his patent at all by opposing within the 21 days. This seems very hard, very unfair, and in direct contradiction to the terms of the contract, but it is so. These cases are ruled by the judgment of Lord Hatherley, in May, 1869, and are already too little known. Bates and Redgate obtained provisional protection on Oct. 2, and Bertie procured his a month later, but he completed at once, and the Lord Chancellor decided that the patent was legally vested in Bertie, but the others might go in for any part of the invention not secured by his patent. What, then, should be done? Clearly this. Do not apply for protection until you are certain that a few weeks more will enable you to do all that is requisite, and when you have got provisional protection give notice to proceed at once, and then apply for warrant and seal, and no one can pass you in the race.

It is really a question of who gets the Great Seal first. If you give notice to proceed you can complete at any time within the six months, but if you find an inventor whose title is similar to yours has also given notice, then you must lose no time in completing. This information you will get from the *Patents Journal*, published on Tuesday and Friday in each week. Be also very careful and very clear as to the title and legal wording of your patent. I am confident that not one-half the patents taken out would bear the criticism of a sharp counsel for five minutes. If the title is obscure or defective in the slightest degree it is in most cases a deadly flaw. In fact, in court it is not the provisional specification which is to be judged so much as the final, but the title is unalterable, and rules both. Your readers will excuse the urgency with which I have written on this subject, but I have known instances where years of anxious thought and labour have all been lost for want in this matter of a little—
PRACTICAL EXPERIENCE.

CLEE HILL COLLIERY.

SIR.—An ordinary and extraordinary meeting of shareholders was held at the colliery, near Ludlow, on Jan. 22, when Mr. Thomas Thompson, jun., the Chairman, said that the board had been much deceived, as also had the shareholders, by the promises made by Mr. Bertram; and all that was said by the directors at their last meeting was based upon the honest conviction that the colliery was capable of making the large returns which he had promised. I take this privilege of thanking Mr. Thompson for mentioning my name, as it gives me an opportunity to explain myself. Thus, when I was asked by Mr. Thompson if I could recommend to them a manager for the Clee Hill Colliery, I said I thought my son, Mr. Tom Bertram, would suit them, and Capt. John Kitto then asked me if I would go once or twice a week to superintend my son, and this I agreed to do. I commenced on Jan. 27, 1873, and was their second manager. Well, my son and I had a very great deal of work to do; this we knew, and told Messrs. Thompson and Kitto; we not only had to improve the place—the last colliery—but to redeem the confidence of the workmen, and that was worse than the first.

In the first place, the colliery was as near a standstill as it could possibly be in every way and shape—pits all out of repair, roads all to renew, new ropes and guide-ropes to be put in excepting one pit, new head frames to make and put up; even the whimsey (or gin) at one of the new pits was a loan, and had to go back to its owner, and during the hard winter we had to send it back, even before we had got timber for a new one; we had the engine put up. The credit at that time was only so and so. After that we soon raised as much coal in one week as they had previously got in a month, and then we could not get the coal away quick enough for want of railway trucks. We now came to the second and greatest difficulty, that was to get the coal by the ton, it was all day-wage work before. In this we found the men very hard to decide, for they said they had been so much deceived in their wages before that they were determined to work by the day, and I saw that it would not do for the company to allow them to work by the day. Then we had a strike—nearly four weeks—on the Knowbury side, before the men would submit to work by the ton. But, glad to say, at the end of that they did submit, and we got on by the ton at each pit, one after the other, and the prices were—Knowbury pits 2*s.* per ton to the end; Powell pits 2*s.* 3*d.* per ton to the way end, 5*s.* per yard in the fast coal, and 2*s.* 6*d.* per yard if a loose end; and at two other pits coal delivered into carts 5*s.* per ton, and slack 1*s.* per ton. The selling prices at that time varied from 9*s.* to 18*s.* per ton, according to quality. So, after I got all this done in nine months, I saw every prospect of getting the shareholders a dividend, but Mr. Thompson, the company's chairman, got Mr. Harrison, the secretary, to write to me, saying, "it was like dodging to make men's wages up by putting them in yards as well as tons." With that I gave in my six months' notice, to enable them to get someone else to dodge better, and they stopped me in one month. Then came Mr. Cooper, the third manager, and he was on about four months, with a Mr. Arblaster. After him came the present managers, Capt. John Kitto and his brother, Mr. F. Kitto. When I left the colliery we were getting as much coal in one week as they get now in a month. A short time before I gave in my notice, Mr. Thompson publicly invited the shareholders to go to the Clee Hill Colliery and see for themselves the great improvements that had been made. This is the first point; but I consider the second was as important as the first—to get men from day work on ton work, and this was done at all the pits. As sure as my name is Bertram I would have made the Clee Hills Colliery a success. But it has been going the back way ever since I left.

I see that Capt. John Kitto gives a good letter, but my advice to the shareholders is, as one of them remarks—"He would not like to have good money after bad."—to be careful. All that has been done since I left was suggested by me, except the tunnel by the hill side. The Chairman wanted me to do that, but I would not; however, he has had that desire gratified since I left, and what is the result? I can open the eyes of the shareholders if they summon me to one of their meetings; I can prove all I say, and likely some-

OUR TIN MINES—PARK OF MINES.

	1872.	1873.
Western district	18	24
West Central.....	74	89
East Central.....	15	25
Eastern district	13	21

N. J.

During the recent depression many mines carried on under both systems have entirely collapsed, and it is to those which have weathered the storm, and not to new undertakings, that the cautious investor may give his attention. All new undertakings are certain to encounter difficulties which the often too sanguine promoters do not anticipate, or perhaps understand; and we do not hesitate to say than any mine having faced and overcome these difficulties is better worthy of public support than a new undertaking, especially if it can show that substantial progress has been made towards proving the value of the property by sales of ore. Many mines which will not pay when worked on a small scale pay handsomely when operations are extended, and any concern asking for capital for this purpose should receive careful attention.

MINER.

Work done as follows—		Ozs. dwts. grs.
<i>Selected mineral containing visible gold.</i>		
Amount crushed from Oct. 23, 1874, to Jan. 16, 1875.....lbs. 1048		
Amalgam obtained.....	128	0 0
Average of amalgam per ton of ore, therefore, equals.....	274	0 0
Average of gold per ton of ore, allowing the amalgam to contain only one-quarter of its weight of gold.....	68	10 0
<i>Rough mineral not showing any visible gold.</i>		
Amount crushed from Oct. 23, 1874, to Jan. 16, 1875.....lbs. 12,653		
Amalgam obtained.....	8	14 0
Average of amalgam per ton of ore, therefore equals.....	1	10 18
Average of gold per ton of ore, allowing as above.....	0	7 14
<i>Total result.</i>		
Total of rock crushed..... 6 tons 2 cwt.		
Average of amalgam obtained from the whole per ton of rock.....	22	7 15
Or allowing, as above, this equals of gold per ton of rock.....	5	11 22

THE REDUCTION OFFICER OF THE CLOGAU MINES.

Mining not unfrequently comes to a standstill in many parts of the world until Cornishmen can be found to proceed with the operations, and to insinuate that the agents are inferior in intellectual

EX NIHILO NIHIL FIT.

Feb. 9.

I should like to have enlarged on some of these incapacities, but it will take by far too much time and space for one afloat in a "cockleshell."

EDWARD SKEWIS,
Moore Farm, Plympton St. Mary, Devon, Feb. 11.

But by referring to my letter it will be found that I only gave these three causes as supplementary; and, though important, not as the three essential causes of failure; and I still assert that the last of the three—"that mines are being worked year after year without the slightest chance of success"—is most important, and, what is more, strictly true. Success, as I understand it, means a fair return of capital and interest for money invested, not the returning of many tons of tin just clearing the cost of outlay in machinery. And who will say that to-day many mines are not being kept up only to profit the agents and brokers? Mines are started often with a view to profit promoters, so far "with a kindly prospect of success," and no further. Saddled with weighty "promotion

money," they are strangled at their birth, and if they survive are gradually ruined by mismanagement and caprice. As I have before said, many of the systems of mining in Cornwall are dangerous. Allow me to give an instance. At present a mine is being worked in Cornwall where up to a very recent date the London management wrote letters to the agent on the mine telling him to telegraph an improvement at one time and a falling off at another time, to favour their plans of "bulling" and "bearing," irrespective of the value of the mine or the truth. Is this the fault of unqualified agents? Yet that mine still drags out its existence, and is now as it ever has been—at a discount in the market. A CORNISHMAN.
Feb. 11.

FOREIGN MINES, AND BRITISH CAPITAL.

SIR.—A great deal has of late been written as to the causes of the non-success of mining enterprises, but as it has chiefly dealt with home mines, I propose to point out a very serious cause of the great loss of money that has for some years past occurred to the British capitalist in foreign and colonial mining properties—the kind of person generally selected by the proposed purchasers to inspect and verify, or otherwise, the reports and calculations of the vendors or their agents of the property offered on this market for sale. It is notorious in the United States and Canada, as also in other countries that I have visited, that the person usually sent out is especially selected, not for any particular qualification that he may have for the matter in hand, or even for business qualities that may enable him to meet on a level the tactics and sharp practices indulged in by the general mass of vendors and their friends, but rather because he is a friend of one of the directors, or else has been recommended by someone to whom he has been private secretary, at any rate he is a man in most cases totally unfitted to the work in which he is engaged, and naturally falls a prey to the sharps surrounding him. I have many instances in my knowledge of the most glaring blunders in calculations having been made by this class of inspector, not only in that which they could not see, but also in that which could be plainly seen and measured, and which in almost every case ends in disaster and ruin to the companies engaged.

It is an unfortunate fact that of the millions put into foreign mining properties within the last few years at least 75 per cent. has been lost, chiefly through the folly and ignorance displayed by the so-called inspectors sent out. When mining companies learn wisdom, and employ proper men for purposes of mine inspection, they will find plenty of room in the colonies and elsewhere for the employment of capital that will bear good interest. A very vivid instance of the truth of the subject on which I address you is now before the public in the Court of Queen's Bench. Unfortunately, however, for mining this is only one case among the many, as the columns of the *Mining Journal* only too frequently show. It is about time that capitalists should address themselves to mining matters as they would to any other business, and not allow experts, sharps, and prospectors to draw the wool over their eyes so cleverly as has for many years past been done, for most assuredly whilst there are flats to be gulled there will always be, to use a Yankeeism, any number of sharps to go for them.—*Plumpton, Feb. 10.* B. ANTHONY.

CRENVER AND WHEEL ABRAHAM UNITED MINES.

SIR.—It appears that additional capital is required for the development of these important mines. Perhaps you will permit me to state my reasons why I should advise that the capital required should be raised. The history of these mines would involve the occupation of a larger amount of your valuable space than I feel entitled to ask; but I shall sufficiently achieve my object—which is to show, first, what these mines have done in the past; secondly, what they are doing now; and thirdly, to indicate what they probably will do in the future—if I bring forward a few facts bearing on the case.

As to the past, to show that these mines were once undoubtedly amongst the richest, if not the richest, mines in Cornwall, I append the following list, which is official, showing the amount of copper ore sold from these mines during the years 1812-23 inclusive:—

Year.	Tons.	Year.	Tons.
1812.....	7,191	1818.....	9,073
1813.....	8,165	1819.....	10,389
1814.....	9,279	1820.....	10,968
1815.....	10,666	1821.....	8,799
1816.....	8,344	1822.....	8,466
1817.....	7,073	1823.....	7,622

Total Tons. 106,725
It will thus be seen that the enormous total of 106,725 tons was produced by these mines in 12 years, or 8894 tons per annum on an average. Without going into reasons why the mines were stopped—a point on which a variety of opinions prevail—I think I may claim for them the merit of having been very rich, and having produced immense quantities of ore.

I now proceed to the present time. Those who, as is my case, have been shareholders from the time of the formation of the present company will have, no doubt, watched the progress of the mines, as a report appears weekly in the *Mining Journal*. It will have been seen how gradually the prospects of immense deposits of tin which were held out to us grew "smaller by degrees and beautifully less" as we drained the water out of the old workings, how the large slabs of tin purporting to be waiting for us were never found, and the mineral for the extraction of which the company was formed (tin) was until recently not found in sufficient quantities to induce the erection of stamps. Now, I am glad to see that by discoveries which we have ourselves made, our prospects for tin are much better. But it is copper to which I wish to draw attention, and to endeavour to show that for that mineral our prospects are indeed bright.

Until recently the supplies of copper ore were derived from a limited area of our property. Now, from the reports it appears that the discoveries of copper ore extend almost from one extremity of the mines to another—over a mile. Those who have watched the sales of the ores during the last 12 months cannot fail to have been struck with the great progressive increase in the quantities, and it is a fact which speaks for itself that whereas our sales have hitherto been bi-monthly they are now to be held each month. I could enumerate the various shafts and levels which are now rich in copper ore, but this I scarcely think necessary, as a reference to the reports before mentioned will supply all details. I merely again claim attention to the broad fact that our copper ore sales have largely increased, and from all indications it is impossible to doubt that they will continue to do so both in quality and quantity. With reference to the costs of working they are well known to be heavy, no mines of the depth that ours are can be carried on without heavy costs, but I feel convinced that in a very short time they will be more than met by the increased sales of the ores. As affairs stand at present it is a matter for congratulation that our hopes are based on copper rather than on tin, as the former is much more remunerative than the latter at present. A reference to the plan shows that the lode in these mines, which was so productive of ore in times past, was often continuously productive for nearly 200 fms. in depth. After having been comparatively poor for a few fathoms underneath all its former richness, it is now giving unmistakable signs of returning productiveness. Perseverance for a short time must prove whether the lode in depth will equal or approach its richness at a shallower level. In my opinion, everything looks most encouraging and promising in this direction.

As I believe there are many shareholders not aware of the great prospects of our mines, looked at both by the light of past achievements and present indications, I feel that there is the less need of apology on my part for laying the statements in my letter before them. Mining authorities nearly all concur that increased depth, as a rule, gives increased richness to lodes, and, therefore, there is no reason why we should not return as much ore as our predecessors did 50 years ago. Assuming that it is possible to do this—which taking as granted that the lode will eventually be as productive as in the past, I think is a moderate assumption, considering the vastly improved nature of the appliances in use now as compared with those in vogue 50 years since. In the event of our attaining this state of former productiveness I need scarcely say what an enviable position we should enjoy: 106,725 tons of copper ore were, as I stated before, sold in 12 years; this would give us a monthly sale of about 741 tons. It is impossible to calculate it out to pounds

sterling, for I do not know how much it would fetch per ton, but it appears that upwards of 1,000,000 sterling was realised by the sale of the 106,725 tons before mentioned.

The richest part of our mines appears to be about the centre of the sett, where a rich lode was met at the 190, which continued rich for 15 fms. in length; at the 208 it had lengthened or spread out to 36 fms., and at the 220, just started, it will probably reach the length of 50 to 60 fms., clearly proving that as we go deeper so we get the lode larger and richer, the copper ore from this part of the lode being of a very high percentage. There are many other parts of the mine where copper of good quality has been found, but I have taken the above case as, perhaps, the most important.

I trust I have now said sufficient to prove the great value and importance of these mines. I trust also that the shareholders will be sufficiently alive to their own interest to do all in their power to retain possession of their property; and after having for five years spent their money freely upon it, will not consent to abandon it at the turning point of its career. I believe an extraordinary meeting is shortly to be held. Let us hope that wise counsels may prevail.
Feb. 10. SHAREHOLDER.

CRENVER AND WHEEL ABRAHAM UNITED MINES COMPANY.

SIR.—As doctors' orders will prevent my attendance at the meeting, on Tuesday next, I request the favour of a small space in your valuable *Journal*. I trust that there will be shareholders present who will advocate my views, and endeavour not only to have the mine worked at a lower cost than that of the last year, but to turn our present resources to more immediate account. I cannot agree with the *ipse dixit* of the Chairman at the meeting on Dec. 10, that "to have 150 men at work instead of 340, and at once bring the mine into a paying state," must involve "certain ruin." In the present state of the mine I think many shareholders would prefer the risk of this sort of ruin, and even to encounter the stigma (for some months if necessary) of working the mine in what I suppose would be called an un-minerlike manner. It may be heresy to say this, and one knows that people are often victims to custom and prejudice; but, as Bob Acres says, "I'd just as lieve be shot in an awkward posture as a genteel one," and, though it may be very improper and un-minerlike to wish to see the eyes of the mine picked, I certainly prefer that process to having my own eyes picked out in the shape of constant calls. According to the Chairman's account, there are now large reserves, which apparently might be utilised, and enable us to pay our way for some time while working with a smaller number of men than hitherto to explore fresh ground. I see that it is proposed to raise a further sum of 20,000*l.*, and I fear there may be a disposition on the part of the directors to insist on the necessity of raising the whole of that amount. As I consider the expenditure might have been less the last year, I am hardly prepared to take debentures for what I fear may be a reckless outlay for the next year or two, even though it is to be balanced by the cautious investment of 5000*l.* in Consols to secure to the debenture holders their own dividends. I must not trespass too much on your space. I shall look with interest for the report of the meeting, as I fear it must be some three or four weeks before I can attend in person to business, and I certainly hope no extreme measures will be decided upon next Tuesday. I enclose my card, and sign myself, as I believe you are aware—
Feb. 10. A CONSTANT READER.

WHEEL MARY.

SIR.—I send you a true copy of Capt. Tregay's report, which I will thank you to kindly insert in the *Mining Journal*.
Feb. 10. THOS. PARKYN.

Wheel Mary.—This mine—situated in the parish of St. Dennis, in the Austell granite range, immediately adjoining the old productive St. Dennis Consols—has lately been found to produce tin for a great distance on a kind of elvan course running nearly north and south. The tin-bearing course has not yet been seen deeper than the bottom of a clay pit, a few fathoms, and only so deep as that in one particular spot, but has been traced on the bank for a great length, bearing tin at many points. In taking samples I rejected the best stones, and took only those of doubtful value. One of these produced 46 lbs. of black tin per ton of stone; another produced 56 lbs. per ton; and another 112 lbs. per ton of stone. I had this black tin reduced to metal, and it produced 14 in 20, equal to 70 per cent. of very fine metal, which is a very good produce, considerably above the average of Cornish mines. These stones were taken from the tin-bearing course, a very few feet from the surface. I would advise several shafts being put down along the course, and a shallow level being taken up to a tolerably low point in the sett to draw off the surface water and prove the lode along its course. A small steam engine will then do all your pumping and stamping, and you will prove the mine cheaply and expeditiously. I have no doubt but that by this course you will lay open some important discoveries of tin.
W. TREGAY,
Manager of the Pedn-ar-drea United Mines.

JAVALI MINE.

SIR.—Referring to the remarks made by "Savans" in his letter which appeared in the *Journal* of Jan. 30 and Feb. 6, I beg to state that the facts are misstated. If he will but take the monthly reports which are published in the *Journal* for the last 12 months, he will find that the average profit did not exceed 20*l.* Then, again, assuming that the mine returned 5400*l.* profit per annum, that is taking his figures, I do not see how this amount can be considered the return on a capital of 9000*l.*, for it is evident the original shareholders would make their calculations on the paid-up capital, which appears to be something like 50,000*l.* I notice that the yield of the Javali has changed considerably in the space of one week; in the former letter it was always 10 dwts., but by the latter 7 dwts., and he finishes up his second letter very ungraciously. The extensive Chontales returned (by last advice) 3½ dwts. only per ton. Now, a little information on this subject would not be out of place, and on looking through the yearly reports of this mine (Chontales) I find that our average for 1870 was 7-10ths, 1871, 7½, and subsequent years about 4 or a little over. We have also a lode which is a continuation of the one the Javali are working, though larger in extent, known as the Pavon, from which we hope in good time to obtain our yield from 7½ to 10 dwts.
Bristol, Feb. 11. A SHAREHOLDER IN THE CHONTALES.

JAVALI MINE.

SIR.—I notice that this mine is now attracting considerable interest on "Change" and adversely so. I wish to make a comparison between it and two gold producing properties.—1. In Port Phillip we have, by the latest advice received, dated Melbourne, Feb. 6, the yield per ton 4 dwts. 7 grs. In this mine we have a capital of 100,000*l.*, standing at 12s. per share, or 60,000*l.* for the concern. In Chontales Consolidated we have the yield per ton by last advice represented by 3½ dwts. of gold only. In this mine we have a capital of 100,000*l.* (that is, 50,000 shares of 2*l.* each), together with an additional 20,000*l.* (in the shape of extra 1*l.* 15s. shares). Compare these two gold investments with Javali Mine, and its average yield of at least 7½ dwts. per ton, and showing a capital of but 11,000*l.* (calling the shares but 10s. per share), about 20,000 shares being only issued. The few debentures taken up are sufficient to erect the still more powerful machinery, and, therefore, to largely increase the returns. Javali, like her sister mine Chontales, is situated in Nicaragua, and it needs but little judgment to show "An Investor" the value of the former. The price of Javali has already advanced, and at the meeting due early in March, transactions in these shares will prove the value of public opinion, and, as your correspondent of last week's *Journal* observes, sooner or later the quotation of this valuable property must rise. The profit appears to average at present nearly 500*l.* per month, which must greatly increase hereafter.
London, Feb. 9. OBSERVER.

THE PROPERTY TRUST.

SIR.—The above was formed about three years ago to purchase a share in a "very valuable" City property, which was to have been sold last year, and their respective portions of the proceeds distributed amongst the holders of 100*l.* certificates under the Trust. The offices were in Bedford-square.
I am just from talking with a gentleman who "wanted to know" about the matter, as some rustic friends of his are in a state of mystification; but on calling at the office for the clerk or secretary, he found that his place knew him not. No body knew anything about the certificates, the profits, or, seemingly, about the concern itself. Of course, the trustees know something; but they are all superior persons—too superior for common people to presume to knock at their doors on a vulgar errand of enquiry about money. Perhaps, on the principle *noblesse oblige*, they will deem it not beneath them to explain, as their names were toiled in the prospectus for the purpose of attracting applicants.
[For remainder of Original Correspondence, see to-day's *Journal*.]

DURABLE CONCRETE.—The invention of Mr. JAMES O'FRIEL, of Brooklyn, U.S., has for its object a cement which will resist great cold. He first makes a cement composed of lime 55 parts, alumina 3 parts, silica 24 parts, potash of soda 3 parts, water glass in solution 10 parts. The above is allowed to set, and when required for use he makes a composition thus:—3 parts of clean sharp siliceous sand mixed with 3 parts of cement when dry, and then wet them with an aqueous solution of liquid glass.

HOLLOWAY'S PILLS AND OINTMENT—HELP UNDER SUFFERING.—No diseases which afflict the human body are more irksome to bear, or more difficult to cure, than skin diseases, whether superficial sores or deep ulcers. Holloway's ointment has proved itself a remedy for these maladies. It clears off scurfy eruptions, heals up cracks and fissures, reduces unnatural heat, mitigates irritation and inflammation, and it at once assuages pains, cleans wounds, and works out a sound and lasting cure more certainly and more rapidly than any other application. In those affections which are probably constitutional or chronic, debilitating habits and constitutional ailments, Holloway's pills should be taken to increase the salutary effects of this unguent.

Meetings of Public Companies.

MOLD-ARGOED COLLIERY COMPANY.

The third annual general meeting of shareholders was held at the offices, Queen Victoria-street, on Tuesday, Mr. F. BENNOCK in the chair.

The report of the directors stated that the quantity of coal raised during the year was 30,272 tons, realising 18,992*l.* 16s. 3d., and after deducting wages, royalty, salaries, directors' remuneration, railway carriage, and other expenses, there remains with the 239*l.* 8s. 1d. brought forward from the previous account a balance of 2640*l.* 8s. 5d., out of which they recommended a dividend of 7½ per cent. be declared, forward to the credit of the next account. The quantity of coal raised in 1873 was 14,231 tons, so that the output has been more than doubled during the past year. Lower prices have, however, ruled, which, together with the delay and expense caused by the tapping of a large body of water in old workings and the commencement of the year, and the strike of the men in the summer, has prevented the realisation of proportionately large profits. The tapping and draining off of the water well known that the danger existed, and it not unnaturally created fear and distrust in the minds of the colliers and other workmen in the pits. As the directors informed the shareholders by circular in September, the strike terminated by the men adopting the reduction in wages of 10 per cent., as insisted on by the board. The great bulk of the coal raised during the past year has been extracted from the excellent quality, and 7 ft. 6 in. thick, and the seam will be opened out for working in a similar manner to that in which the Hollin was developed. The duty from the Main, makes the present output of coal from both seams nearly 1000 tons a week. Now that the alterations and extensions to the brickworks have been completed it is anticipated that they will yield a considerably larger profit during the present year. The erection of cottages has been proceeded with on the company's freehold, and six are now ready for occupation, and are let to the colliers and workmen at the colliery. With the view of constructing twenty more cottages, and for the provision of working capital and funds for reaching the Cannel seam when considered advisable, the directors propose, in accordance with the power conferred on them in the Articles of Association, to create debentures for the sum of 7500*l.* for five years, bearing interest at the rate of 10 per cent. per annum, the security being a first charge on the company's property and effects. It is intended now to offer 5000*l.* of this amount to the shareholders *pro rata* with their present holdings in shares.

The CHAIRMAN said it was his pleasure as well as his duty to draw attention to some facts contained in the report, which, however, was so full and explicit that a very few general remarks would be sufficient to enable them to proceed to the more important and interesting business of the meeting. Looking at the accounts, upon the whole, they were pretty satisfactory. The expenditure last year had been greater than anticipated, which had arisen solely and entirely from an increase of wages from 33 to 37 per cent., and from the number of wagons purchased on the hire system—that is, paying so much per annum until they became the property of the company. In all new concerns the first expenses were larger in proportion than when everything had been thoroughly established. It was mentioned last year that a certain number of shares had been kept in reserve, in the event of any of their workmen being disposed to become shareholders, but as advantage had not been taken of the opportunity, and more capital being required, those shares had been disposed of to one of his friends. As to the working of the colliery during last year, it had been both interesting and important. There had been some difficulty with regard to the men, who became timid as they approached some old workings, which contained a body of water, requiring to be tapped with the greatest possible care. This had the effect for the first three or four months of the year of decreasing the output to 60 or 70 tons per day; and as the fixed expenses were the same it became a matter of anxiety, but, as the managers assured them would be the case, the water was carefully and successfully tapped, and within three weeks instead of having 60 tons they were raising 110 to 120 tons per day. Then came the second period of their difficulty—the great decline in the price of coal and the subsequent strike. The price suddenly declined 30 to 40 per cent. Thus, six or seven months of the year embraced in the accounts were almost profitless, arising from the two causes to which he had referred—causes altogether beyond the control of any human foresight. Then came the important question as to whether they should continue paying the same rate of wages as hitherto. After mature deliberation they determined to give notice that a reduction of 10 per cent. would be made. The men demurred, and offered to take 5 per cent.; the result was that they struck, and were out of work for several weeks. The communication, however, had the desired effect, and the men came in at a 10 per cent. reduction. By comparing the number of men employed as labourers with those employed as cutters they considered the number larger than necessary, and insisted upon a reduction of 10 per cent. in labour, the effect of which was to diminish the expenditure while retaining the average output. As a principle unique in the management of a colliery, he might mention that this 10 per cent. reduction was also applied to the secretary, clerks, and to the directors themselves, the result of this economy had been that they were able to declare a dividend of 7½ per cent., absolutely realised in a little less than five months of the year. They had been bringing up the leeway as well as paying this dividend, which was a very hopeful feature, for they were gradually increasing their output without increasing the expenses, and if 7½ per cent. could be earned in four months it was not unreasonable to look for more as the result of the working for the present year, unless some great or unforeseen catastrophe should occur. From the contracts which they had upon their books they felt pretty confident of the result—he believed by the end of June they would be able to declare an interim dividend as well as the annual dividend at the end of the year. The cutters were really the bees who made the honey, and he had been in communication with the various districts endeavouring to harmonise a system—a rule of three—by which they should be able to determine the number of labourers that should be employed as compared with the number of cutters. The result has been that instead of 7s. 6d. per ton, they were in the happy position of having reduced the costs to 5s. 6d. at the pit, a difference of 2s. in the cost of every ton of coal. He had received a letter from one of their largest shareholders referring to the Cannel coal, and asking whether it would be advisable to sink upon that coal immediately, and whether they were perfectly satisfied it existed in the colliery. In reply to that letter he might inform the shareholders that they knew from the fact that it existed in the adjoining collieries on both sides of them that the Cannel coal was there, but they would have the whole matter tested and tried before expending any important sum of money upon it. Referring to the Main, when driving a series of troubles or faults were met with, but curiously enough as the working continued the faults disappeared until a solid coal had been reached, and it was now in every respect superior to the seam above, and was 7½ ft. thick instead of 6 ft. 3 in., and the coal being of a high quality cannot fail to greatly increase the value of their production. The brickworks were going on exceedingly well, and the price continued most favourable, they were making a good profit, and had orders equal to the number they could make. The whole of the machinery was in good working order, and there appeared no necessity to increase it—all the substantial works were in thorough order. Of the 24 cottages, last year contemplated to be built, six had been erected, and were let to several of their best men at a rental which would give a return of 12 or 12½ per cent. on the outlay. That was one reason why the directors asked for an increase of capital to ensure the comfort of the men, as well as the well-being of the concern itself. They had asked for debentures because they did not care to increase the share capital, seeing the probability that the profit would be such as to enable them to pay off the debentures in a limited time. He had to explain how it was they had only given 7½ per cent. dividend this year. Dividends were very seldom expected in collieries before the end of three years, but in this case they had been able to pay 2½ per cent. for the first year, and 10 per cent. for the second, but that had been the result of exceedingly favourable circumstances, and the 7½ per cent. now recommended had been honestly and fairly earned. He held that after 6 per cent. had been paid upon their capital all dividends should be regarded as redemption of capital; if they paid 20 per cent. so much the better; they could then consider 14 per cent. as redeemed capital, so that in seven years the whole capital would be returned with 6 per cent. per annum as profit. The output was now going on at the rate of 40,000 or 50,000 tons per annum, and without increased expenses; everything looked favourable, especially as they

had contacts for as much as they could supply up to the end of April. (wing to the difficulties in South Wales they had received a contract from Swansea at a price which left a good profit. When application was made to them to join the coalowners' combination in North Wales they considered the question with great deliberation, and for the time had not joined the combination, and, instead, had proposed to their men to work another day in the fortnight, by which the shareholders would be greatly benefited, and at the same time the workmen themselves. If the workmen would not do that the result would be that the directors would be compelled to join the combination, but in the meantime, as they had contracts on hand for three months ahead with a certain profit, they did not think it well to disturb those for the sake of joining the combination before which all pay lists and everything must be disclosed, and they could no longer control their own working; that for the present they objected to, showing rather that they took an interest in their men. He hoped what he had said would be regarded as satisfactory, and moved that the report and accounts be received and adopted, and that a dividend of 7½ per cent. (payable on March 15) be declared.—Mr. WILCOX, C.M.G., seconded the proposition. Mr. WILLIAMS (Chester) said he agreed with everything the Chairman had said, but with the terms upon which the additional capital was proposed to be raised, except with the terms upon which it was proposed to be raised. He did not see why they should pay 7 per cent. for money when it was not wanted. The Chairman said they had sundry creditors 2000l., and there were debtors 3750l., leaving only 800l. working capital.

Mr. WILLIAMS would rather pay 5 per cent. to the banker. Mr. DUKES (the secretary) mentioned that there was 3000l. on the books. Mr. E. J. BARTLETT said that as each shareholder had the privilege of subscribing for the debentures the objection of the last speaker was at once removed. He said he was surprised when he saw it was proposed to raise money upon debentures, but certainly that was better than by the increase of the share capital. Colonel RATCLIFFE said that 7 per cent. did seem for a respectable company like this a high rate of interest to pay. With such an honourable board of directors this a high rate of interest to pay. With such an honourable board of directors this a high rate of interest to pay. With such an honourable board of directors this a high rate of interest to pay.

Mr. BROWN asked if there were any contingent liabilities?—The SECRETARY said there were no claims whatever. The Chairman said that the only money advanced was that necessary for the carrying on the works, and that had been borrowed upon the personal security of the directors.

Mr. WILCOX asked the value of the wagons at the end of the seven years, when they became the property of the company?—The Chairman said the amount paid for the wagons during the seven years would be added to capital, in the meantime all repairs were included in the current expenditure. The life of a wagon was computed at 21 years, with repairs.

Mr. WILCOX asked if the cost of the working of the colliery during the present year, which compared unfavourably with that of 1873.

The Chairman said that had arisen from the causes to which he had referred in his opening remarks—the sudden fall in the price of coal from 15s. to 10s., which had reduced that proportion of profit. It was just the reverse the previous year.

Mr. BROWN said the chief reason for the lower result this year was due to increased wages.

Col. RATCLIFFE thought the great difficulty had been the loss resulting from the want of a proper output, which now appeared to be overcome.

The Chairman said they had now some really hard-working, honest men, and they were doing all they could to encourage them by building cottages and doing other things.

The motion adopting the report and accounts and declaring the dividend was put and carried unanimously.

Upon the proposition of the Chairman, seconded by Mr. MACKESON, Q.C., the re-election of Mr. Powell as director was unanimously agreed to. Mr. Mark W. Carr was re-elected auditor.

An extraordinary general meeting was then held, at which resolutions were passed relating the number of shareholders necessary to form a quorum for the holding of a general meeting, and to empower the directors to declare interim dividends.

A vote of thanks was passed to the Chairman and directors, and also to the secretary. The meeting then separated.

MWYNDY IRON ORE COMPANY.

The thirteenth annual general meeting of shareholders was held at the offices of Messrs. John Taylor and Sons, Queen-street-place, on Wednesday.—Mr. ALEXANDER BROGDEN, M.P., in the chair. The report of the directors (which appeared in last week's Journal) was taken as read.

The Chairman said he had to congratulate the shareholders upon a very good year—a very considerable profit had been made, while other companies connected with iron had had very disastrous periods to pass through. As far as this company was concerned, they had fortunately had a very favourable year—during that year they had paid off the mortgage which had existed upon the company's freehold for some time, and they now had neither debenture debt nor mortgage debt, and the whole capital was represented by the share capital. They had had a very large raising of ore, amounting to 16,000 tons more than the previous year, and considerably more than had been ever raised in any year during the existence of the company. That had been attended necessarily with increased cost and outlay, but not in greater proportion than the increased quantity represented. Last year there had been expended on repairs of trucks and on Taylor's shaft a considerable sum of money, but in that item was included the cost of the conversion of wagons rendered necessary by the change of gauge, the whole of which had been charged in the revenue; but they had saved 500l. a-year interest upon the debentures. The shareholders might reasonably say, with all this large profit why is not a large dividend declared? The directors had had this question under their careful consideration, and themselves holding a very large stake in the concern, had thought it more prudent to pay a respectable dividend and look to the future of the company than to divide large sums now without being placed in a position not to maintain it in future years. Therefore, they had written off upon capital account 4700l. as against the profit this year, and also charged the whole of the expenditure incurred on the Treacastle property, including the purchase of a Diamond boring machine with all necessary apparatus. That was a fair subject for shareholders to make observations upon, but when they looked at the nature of this company, and considering it was to a large extent dependent first of all upon the prosperity of the iron trade, and next upon the continuance of the mine, they would consider the directors had taken a prudent course in not dividing too much, looking rather to the future than to the present division. As to the Treacastle property, which had cost a considerable sum of money, the researches had resulted in the discovery of what appeared to be a very fair, if not a considerable, deposit of ore; and the directors were now rather endeavouring to find out the proper places to work than further discoveries, for there were indications enough to justify them to put down a pit, and open a mine upon that property. In all these things there was considerable risk, and although they could not say positively that ore existed in large quantities, yet there was quite enough discovered to justify them going to a further expenditure. If it turned out well they might say the concern would be upon a very good footing. It was a very considerable property, and would be an entire addition to that held by the company before. There was another adjoining property, about which negotiations were pending, but he was scarcely in a position to speak very freely about it at present. It immediately adjoins Mwyndy. The person who had the lease had asked a large price, but it was probable satisfactory terms might be arranged. If arrangements were made they would be able to work a considerable portion of the mine out of that property, and leave large resources in the Mwyndy property proper. The reports gave every detail, and gave them, especially Mr. Taylor's report, all the information which could be given as to the present position of the mine. He then moved that the report and balance-sheet be received and adopted.

Mr. JOHN TAYLOR seconded the proposition. The Chairman had indicated that there were two chances of additional returns, which might extend over a great number of years—he alluded to the Treacastle and to the property situated to the east of their workings. It was a curious fact that there were only two considerable deposits of this class of ore—the Mwyndy was the most remarkable, and the other was in the adjoining property of Lord Bute. There was no other in that particular locality. The total quantity returned by this company had been 675,000 tons. The property had many advantages—it was freehold, so that they could work where, when, and how they liked, and inasmuch as it had paid a considerable amount in the shape of dividends it had recouped the company for any great railways in that part of Wales. Their attention had been first directed to the Treacastle property by their very intelligent and excellent manager, Capt. Vivian; it was approached by a small branch railway running from the station at Llantrisant, and a convenient place for getting the ore in the market. At the deepest

point—260 feet—a considerable mass of ore had been intersected, not altogether of the best quality, but in that district it varied, being sometimes solid, and at others containing ochreous substances, which was an ore of iron, and saleable as ochre. The rock was limestone, the same as in Mwyndy, and the other geological conditions were the same, so that the probability was that the prospects would prove successful. They were well supplied with funds to work it, and while it would be difficult to submit an estimate of the cost of winning—and he should be very sorry to state any sum—he believed and hoped the cost would not exceed 5000l. or 6000l.; if said and other difficulties were met with the expenditure might be more, but at any rate enough had been seen to justify such an expenditure, having an excellent staff and all appliances. They had been lucky in selling their ore—all along they had a good demand for it, and they had been lucky in the various explorations made underground in finding considerable quantities to enable them to bring up to the surface larger quantities than in previous years, and certainly larger than could have been reasonably anticipated.

The Chairman, in reply to questions, stated that the item for materials included the cost of the reconstruction of the wagons, timber, iron, and other things required for the mine.

Mr. TAYLOR said when the Great Western determined to alter the gauge they did not help them in the matter.—In reply to further questions, Mr. TAYLOR said that the estate consisted of 175 acres, of which something under 100 acres were farmed, the produce of which was wanted for their horses.

The Chairman said that the farm just about paid its way. One advantage was that they could open ore ground without soliciting favour from anybody.

The report was received and adopted.

A dividend of 4s. per share was declared, making (with the interim dividend of 2s. paid in July) 6s. per share for the year.

Mr. Fletcher and Capt. Pelly, B.N., were re-elected directors, and Mr. Scott was re-elected auditor.

A vote of thanks was passed to the Chairman and directors, and the meeting then separated.

NEWPORT-ABERCARN BLACK VEIN STEAM COAL COMPANY.

An extraordinary general meeting of shareholders was held at the offices, Billiter-street, on Thursday.

The Rev. Mr. WARD in the chair.

The SECRETARY read the notice convening the meeting.

The Chairman said the directors had called the shareholders together in order that they might be made acquainted with the exact position of the company's affairs. They felt considerable anxiety from the fact that the ground through which the pits had to be sunk absolutely defied all the predictions of the most able men in Wales. That had impeded the sinking, and he was afraid to state the exact time they were likely to see the veins, and therefore there had been a postponement of the fulfilment of those wishes which they had previously felt justified in holding out to the shareholders. They hoped with the assistance of the very able machinery, which would not cost them much, to expedite that matter. He should be afraid to say how many times they hoped to multiply the present rate of advance. It was proposed to employ McKean's rock-drill, which was the best and most perfect of its kind. Of course, the contractors would bear a great part of the expense of introducing such a system which might otherwise fall upon the company. The balance-sheet showed there had been a considerable expense for machinery, which, as circumstances had subsequently proved, had been obtained before absolutely required to be put in use; this expense included the purchase of pumping and other machinery. They were receiving from the Patent Nut and Bolt Company as rent 3500l., and when they reached the company's ground that payment would be increased. He much regretted that their managing director was not present, because as a practical man, and always on the spot, he would have been able to have furnished any additional information shareholders might desire. He had, however, written the following letter:—

NEWPORT, Feb. 10.—DEAR SIR: I wrote you on the 8th inst. that I feared I could not attend the meeting to be held this week. I do not think we shall require powers to borrow 20,000l., though it may be wise to take them. My own opinion is that our capital is quite sufficient to take us down to the Black Vein, and to open it out and work it. All that I think it useful to ask for would be the power to borrow money on the cottages now in course of erection on ground acquired by the company after its formation, and, therefore, not thought of or provided for at the time. Not a day passes but I am in consultation with our manager, Mr. Green, and I hope in a comparatively short time we shall reach the Black Vein, when I feel sure we will be a source of considerable profit to the company. I regret very much that I shall be unable to attend the meeting to-morrow, but I feel sure that the shareholders will excuse my absence when they know that I am attending to the interest of the company by remaining here.—T. BEYON.

The Chairman then referred to the details of the different pits, and mentioned that the cottages were built of solid stone and roofed with slate; of the first block twelve were nearly complete, and the second block would be ready in a few weeks. The charcoal was sent by rail, and they hoped sooner if not earlier to be supplied with water, and other stoppages did not occur. The extraordinary fall of snow, and the subsequent rapid thaw, had a most damaging effect upon two of their pits—in fact, they were entirely flooded out, and they were now making what was technically known as "lodgments," or clisters, where the water from each pit was stored, so that they would soon be able to resume the sinking. The hardness and thickness of the rock had much surpassed their own anticipations, as well as those of the most skilled men, besides which all other calculations had been utterly misplaced, and they could not but be disappointed. The total sum expended was about 30,000l.—for sinking and hauling, 27,000l.; machinery, 2,000l.; and cottages, 7500l. There would be no difficulty in raising the money which Mr. Beyon proposed on the cottages, and it would be for the shareholders to decide whether that proceeding would meet with their wishes, or whether they would approve that plan about to be submitted. He might add that the pumps were erected, and all that was wanted was to make the connection by pipes, which would be shortly done; they would then be in readiness to free the pits from water. He then read the following resolution:—

"To strike out paragraph 11 of the Articles of Association, and to substitute the following paragraph in lieu thereof:—'The directors may make calls to the extent of 2l. per share upon the members in respect of all moneys unpaid on their shares (other than shares issued as full paid-up) as follows—one call of 1l. per share, to be made payable on the first day of March next, and a further call of 1l. per share to be made payable on the first day of June next, and may call up the balance of the uncalled capital of the company required in calls not exceeding 1l. per share on each call, but so that a period of three months shall intervene between the call to become payable on the first day of June next and the day when the subsequent call shall become payable, and a like period of three months shall intervene between all subsequent calls, and each member shall be liable to pay the amount of all calls made to the persons, and at the times and places to be respectively appointed by the directors.'"

The Chairman added that the board now felt that which they intended to be an indulgence to the shareholders had rather the contrary. They postponed the call last year, but they found that their desire to grant that indulgence to the shareholders and to themselves (the directors) was not upon a sound foundation, as it now became absolutely necessary that they should have more money, and it would be for the shareholders to decide as to the ways and means, and raise that money. The only object and desire of the directors was to secure and promote the best interests of the company, and this they believed they were doing by offering what they considered the groundwork of a sound and stable way of raising the money proposed.

Mr. CECIL RAIKES, M.P., seconded the proposition, and stated that it was during the time he was Chairman of the company that it was resolved to postpone the call which had to a certain degree led to their requiring money earlier than expected. The intention of the directors was that there should be six months' interval between the calls, and last year they postponed the call which was due in February until April, in order to afford the greatest possible convenience to the shareholders, but now they wanted the money expended upon the machinery, and although the outlay had been very considerable, it had not exceeded the estimates made in the first instance, but it had been required rather more rapidly than was anticipated. They had no reason to expect that the rock would have proved so hard, and they had incurred the expenditure necessary for the machinery when the pits should begin to work. That was the reason they were obliged to anticipate the call; the Chairman had told them the substance of the reason which had led them to make an appeal to the shareholders in their own interest, and he felt assured that Mr. Beyon's opinion was that it would, probably, not be necessary to exercise the borrowing powers now sought to be obtained, but the fact was the directors did not intend to exercise the powers. It was true that Mr. Beyon told them in the letter just read that the capital of the company would be quite sufficient to carry them down to the Black Vein, but he (Mr. Raikes) felt satisfied that the shareholders would see the wisdom of not fettering the hands of the board in their wish to promote the interests of the company. He might say that the directors felt quite an undiminished confidence in the prospects of the company, and he believed that the hardness of the rock rather implied that under it would be found a better quality of coal.

A SHAREHOLDER asked if the borrowing powers were exercised whether it would not be necessary to borrow the money—one great inducement to borrow the money would be to do away with the necessity of making calls.

The Chairman, in reply to a question, stated that the directors had made themselves personally responsible for 15,000l.

Mr. WILSON said that the company's business was, no doubt, conducted in a proper manner, and that the true policy of the shareholders would be to support the directors. They had not been asked to do more than they were able to do, but he would sooner see the property developed quickly than otherwise, because he wanted as soon as possible to receive an interest upon his investment. It was only right and just that they should meet their liabilities as they occurred, so that the borrowing powers was only a secondary consideration.

Mr. GETHING said the directors had instructed him, as solicitor of the company, to prepare a resolution to borrow 20,000l. upon debentures, but his advice was that a discretionary power should be given which they were entitled to give under the Articles of Association.

The Chairman said that the property was in the highest repute in Wales, and that the public there were only waiting for the colliery to be got to work to rush in and purchase the shares with as much avidity as they now showed reluctance.

Mr. B. C. GREENHILL bore testimony to the efficient manner in which the works were being conducted; they were a credit to the company. He also bore testimony to the indefatigable exertions of Mr. Beyon.

The resolution was then put and carried unanimously. The Chairman then proposed: "That this meeting hereby sanctions and empowers the directors to borrow and take up at interest any sum or sums of money, not exceeding in the whole the sum of 20,000l., upon such terms and conditions, conformably with the Articles of Association of the company, as the directors in their discretion may deem expedient or advisable."

Mr. BOWDEN seconded the proposition, which was put and carried unanimously. A vote of thanks to the chairman and directors concluded the proceedings.

KINGSTON VALLEY MINING COMPANY.

An extraordinary general meeting of shareholders was held at the company's offices, Gresham House, on Thursday.

Mr. S. F. PORTER in the chair.

The notice convening the meeting having been read,

The Chairman remarked that they had met to receive the report of the committee appointed at the last meeting. The committee's report was already before the shareholders, and with one or two alterations, of which the committee approved, the directors agreed with it. They proposed to reduce the present subscribed capital of 50,000l. to 20,000l., instead of which the directors proposed to reduce it to 25,000l., in shares of 1l. each. Of these 10,000 would be ordinary shares, which would be given to the existing shareholders for the property in the proportion of one share in the proposed company for every four shares now held; 15,000, of which it was intended to issue only 10,000 at present, were to be preference shares, carrying a preference dividend of 15 per cent.—he rather wished it had been fixed at 12 per cent., although it was certainly immaterial, as if the mine could not pay far above 1500l. a-year profit it was not worth working, and 5000 were to be held in reserve in case more capital should be required at a future time. It was thought that with the issue of this amount they would have ample to bring the mine to a successful issue, and they were confirmed in this view by what they were told by their manager and engineers. One of the committee before pledging himself to advance a considerable proportion of the new capital sent his own engineer—Capt. W. Rowe, of West Frances—to examine the property, and he was glad to say that the report was confirmatory of all that Mr. Sopwith and other engineers had put forward. The subjoined is the report:—

KINGSTON VALLEY MINE, Jan. 22.—In accordance with your request, I inspected this mine yesterday, and beg to hand you the following as my report and opinions thereon:—The engine-shaft is sunk perpendicularly 15 fathoms below the adit, or 30 fms. from surface. The 15 cross-cut was driven south, and the lode intersected in about 4 fms. driving. It was then opened on west for a considerable distance, throughout the greater part of which lead and blende in fair quantities have been met with, the lode in the present end being of the same favourable character, producing mineral in paying quantities. A rise is now being put up in the back of this level, situated about midway between the cross-cut and the end, for the purpose of communicating with a winze sinking in the bottom of the adit level above. In a few days this communication will be, no doubt, effected, and a good section of profitable ground will be thereby laid open for expeditious working. It is an important fact that the value of the lode and its general appearance have considerably improved in this winze during the sinking, and this encouraging circumstance is quite in keeping with the characteristics of the lode observable throughout the whole of the operations at the deepest point it has yet been seen. The composition of the lode, the nature of the country in which it is embedded, and every other circumstance which came under my notice, all seem to favour the inference that by sinking and opening up the lode at deeper levels the deposits of minerals will be found to be more concentrated, and consequently more valuable. In order, however, to prove this it is imperatively necessary that more effective machinery than is at present available in the mine should be provided. The rotary engine now working is by no means adequate for the purpose, and I should advise that a more powerful engine, of not less than 40-hp. cylinder, be at once erected. The rotary engine is advantageously situated, and would be sufficiently effective for drawing the stuff and crushing the ores raised. There are already 35 tons of lead ore at surface (necessarily imperfectly dressed), and between 200 and 300 tons of stuff underground and at surface, which with proper dressing appliances could be easily and profitably rendered marketable. The outlay necessary for carrying out the above suggestions is, in my opinion, amply warranted. I do not remember ever seeing a mine which presented at such comparatively shallow depth more favourable indications of valuable deposits of mineral at a reasonable depth than Kingston Valley Mine, and I have, therefore, no hesitation in strongly advising the shareholders to lose no time in vigorously developing their property.—W. ROWE.

Mr. HILDEBRAND RAMSDEN, at the request of the Chairman, explained the alteration which it was proposed to make. Before he read the resolutions it would be better to read the detailed basis. Assuming the meeting to pass the resolutions, an agreement would have to be entered into embodying the arrangement on the detailed basis, and having the liquidators on the first part, Mr. Gibson on the second part, and the trustees of the proposed Kingston Consols Company on the third part. After explaining what the agreement would recite, he remarked that the effect of it would be that the liquidators of the existing company, with the consent of Mr. Gibson and the proposed company, would agree to accept, and Mr. Gibson and the old company would execute the transfer. The Kingston Consols Company would have a capital of 25,000l., in 1l. shares, of which 10,000 would be ordinary shares, and 15,000 preference shares, 10,000 of the latter to be offered for immediate issue. There will be quarter shares provided for by the Articles, because, as the old shares would be received in the proportion of four for one of the new shares fractional parts would be necessary. As to the 3500l. due to Mr. Gibson, he had agreed to take 2000 fully paid shares, and the remainder by instalments. The resolutions for carrying this arrangement into effect would be:—1. That the Kingston Valley Lead Mining Company (Limited) be wound up.—2. That Messrs. S. F. Porter and D. Forrest be appointed liquidators, and that their remuneration be 1l. 1s. each.—3. That the liquidators be authorised to transfer, under section 161 of the Companies' Act, 1862, or in such other mode as the liquidators may determine, the property and business of the company to a company intended to be formed under the name of the Kingston Consols Silver Lead Mining Company (Limited), upon the terms specified in the detailed basis or heads of agreement now produced to the meeting.—4. That the liquidators be authorised to exercise all such other powers as are usual to liquidators, or such other special powers as the meeting may direct.

A SHAREHOLDER enquired whether he correctly understood that they were to have but one new share for every four now held? He had paid 40l. for his shares, and understood that for these he was to receive but 10l. worth of shares in the new company.—The Chairman said that that was so, but inasmuch as the entire nominal capital of the company had been reduced each shareholder would still retain about the same proportion of the mine. The only difference was that in order to obtain the necessary additional capital the shareholders accepted ordinary instead of preference shares.

The resolutions having been seconded by Mr. ENGELBACH, were put to the meeting, and carried unanimously.

Mr. SIMS said that it might be interesting to the other shareholders to know that he, resident in the locality of the mine, a practical miner, and he might say a successful one, was so satisfied with its prospects that he had gone in as a large shareholder. Mr. ENGELBACH said that Mr. Bowthorpe, jun., told them that lead was now worth 22l. per ton, so that the price of 75 to 80, or about 6 tons per month, would give the interest on the whole of the preference stock, and if the mine would not give enough for that it was not worth working.

A SHAREHOLDER enquired how much must be subscribed to justify the directors in allotting?—The Chairman thought they might allot upon from 4000l. to 5000l. That would so far develop the mine that they would be beyond difficulty. All that they had expended up to the present time was but from 4000l. to 5000l., and they believed that the further expenditure of an equal amount would put them in possession of a good mine.

Mr. SIMS concurred, and remarked that the money hitherto expended had been for the development of the mine, and had, in his opinion, been judiciously expended. The Chairman said that it would be desirable that the directors should know as soon as possible how much would be subscribed, and requested the shareholders to send in their applications without delay.

Votes of thanks to the Chairman and to Mr. Gibson terminated the proceedings.

DENBIGHSHIRE CONSOLIDATED MINING COMPANY.—A meeting of shareholders was held at the offices, on Thursday (Mr. Francis Rudall, jun., in the chair), when the secretary (Mr. E. J. Bartlett) read the notice convening the meeting, also the special resolutions which were adopted on Jan. 27. It was unanimously resolved that the same be duly confirmed.

ALLTAMI COLLIERY COMPANY.—A meeting of shareholders was held at the offices, on Thursday (Dr. Burt in the chair), when the secretary (Mr. E. J. Bartlett) read the notice convening the meeting, also the resolutions adopted at the extraordinary general meeting, held on Jan. 27. The Chairman, in moving that the special resolutions be confirmed, stated that satisfactory information had been received since they had last met regarding the coal at section B, and that the operations at the works were proceeding most satisfactorily. The resolutions having been put to the meeting, it was unanimously resolved that they be and are hereby duly confirmed. A vote of thanks to the Chairman ended the proceedings.

For remainder of Meetings see to-day's Journal.]

EXCAVATING MACHINES.—A Correspondent, writing from San Francisco (Jan. 20), says—"An enterprise worthy of record is on foot to construct a canal through the most fertile regions of the San Joaquin Valley, not only for the purpose of irrigation but for that of navigation. The contemplated canal will lead from the mouth of King's river, at the north end of Tulare Lake, at an elevation of 200 ft., and will follow the western slope of the San Joaquin Valley for 200 miles until it reaches tide water in the Bay of San Francisco. The country through which the canal will run is admirably adapted for irrigation, the soil is a rich loam, and there are no hills or rock-cuttings to cause expensive earthworks. The excavations will be principally done by the Blusser and Wauchoppe machines, the operations of which we had an opportunity of admiring while examining the canal already constructed with their aid. The former machine is worked by two horses and a man; it consists of a plough-scoop, to which is attached an endless rubber draper or carrier, on which the excavated earth is carried up, falling into a dump cart. It takes on an average two minutes to fill the cart (which holds three-quarters of a cubic yard) and to dump the earth. The average work is 80 cubic yards per day of 10 hours, and the average cost 3d. per cubic yard. The Wauchoppe machine is worked with 10 horses and three men, and is constructed on much the same principle as the Blusser. This machine, in a good working soil such as loam, will excavate and deliver on the bank 1000 cubic yards a day, at a cost of 1d. per cubic yard. Without these machines the same class of work, with Chinese labour and the common scraper, would cost 8d. per cubic yard. For locks and every other kind of canal work the Oregon pine and redwood have been found preferable to brick and stone work. It is estimated that 200 miles of canal can be easily constructed within two years' time. When finished the canal will open out the whole of the west side of the great San Joaquin Valley, making 300 miles of steamboat navigation practicable during the whole year between San Francisco and the head

of the valley. Tulare Lake, whence the water supply will be derived, is a third larger than the Bay of San Francisco. It is fed by an immense water-shed of the snow-capped mountains of Sierra Nevada, and covers an area of 700 square miles.

FOREIGN MINING AND METALLURGY.

Metallurgical industry remains in a quiet state in France. Only a few small orders come to hand; these and the completion of old contracts keep the works employed for the time. Prices are generally somewhat low; this is due to the fact that some recently established works, in endeavouring to develop a connection, offer advantageous terms to consumers, contenting themselves with very small profits in the first instance. Some of the great establishments are working with vigour, but at relatively low rates. Two of them are exceptionally favoured, and have some important orders on hand for rails as well as for armour-plates for ships. The Paris market has been quiet; first-class merchants' iron is quoted at 91.4s. per ton, but this price is to some extent nominal. Heavy plates are worth 111.12s. per ton. In the Champagne group refining pig is in little request. In the Nord merchants' iron for re-arranging has brought 84.8s. per ton. A slight revival in business has appeared in the Ardennes district. In the Rhône group business is still quiet. It is hoped that the downward movement in coal noticed in France, as well as elsewhere, will exert a favourable influence upon the French iron trade; it cannot well be otherwise, in fact.

At Paris, Chilean copper in bars, delivered at Havre, has made 88s. per ton; Chilean copper in bars, ordinary descriptions, 86s.; Chilean copper in ingots, 91s.; English tough cake, 91s.; and pure Corocoro minerals, 87s. per ton. Dronheim has brought 50 fls. to 52 fls. at Rotterdam, and Russia Crown 51 fls. The deliveries of Banca tin in Holland in January were 5756 blocks, as compared with 6258 blocks in January, 1874, and 6201 blocks in January, 1873. The stock on schedules in Holland, Jan. 31, 1875, was 32,440 blocks, against 34,225 blocks Jan. 31, 1874, and 28,251 blocks Jan. 31, 1873. The unsold stock of the Dutch Society of Commerce, Jan. 31, 1875, was 103,880 blocks, against 107,201 blocks Jan. 31, 1874, and 83,472 blocks Jan. 31, 1873. Tin has been rather drooping at Rotterdam. Several transactions have taken place in Banca at 55½ fls., and at the last dates there were sellers at 55 fls. Billiton has also slightly given way; disposable has sold at 54 fls., but at the reduced rates current transactions have presented some importance. Lead has been neglected. At Paris, French lead, delivered at Havre, 23s. 8s. per ton. Zinc has been maintained with firmness. The stocks of this metal upon the principal markets are stated to be much reduced. At Marseilles, rolled Vieille Montagne zinc has brought 32s. per ton.

As usual at this period of the year the requirements of Belgian coal consumers are falling off; colliery owners are only working up old orders, and begin to show a little uneasiness in regard to orders for the future. Buyers exhibit for the present great hesitation, and transactions are concluded with some difficulty. The price of some descriptions of coal remains, nevertheless, nominally unaltered at Liège, as well as at Charleroi and Mons; other qualities, on the other hand, are declining in price, in consequence of the accumulation of stocks. Official returns show that the imports of coal into Belgium in 1874 amounted to 458,282 tons; this total was 213,554 tons below the imports of 1873, but 247,000 tons in excess of those of 1872. In last year's total of 458,282 tons England figured for 243,361 tons, the Zollverein for about 76,000 tons, and the Low Countries for 52,300 tons. The aggregate exports of coal from Belgium last year amounted to 3,886,366 tons, against 4,157,903 tons in 1873, and 4,608,016 tons in 1872. The exports of coke from Belgium receded last year to 227,197 tons, against 574,633 tons in 1873, and 801,820 tons in 1872.

Notwithstanding that efforts have been made to keep up coal quotations in France, a fall in prices is steadily extending, and it appears probable that this downward tendency will continue to be witnessed for some time to come. Stocks are very considerable, and the great French railway companies have supplies which will keep them going for some time to come. The metallurgical works having, with some rare exceptions, only small orders on hand, do not conclude contracts far in advance; and, finally, the weather not having been very severe, domestic consumption has not been very active. All these circumstances combined militate against any efforts which coalowners may make to secure an advance in rates. Upon the Paris coal market the downward tendency has been very marked; in the basin of the Loire quotations have been nominally maintained.

There is little fresh to report in connection with the Belgian iron trade. The Minister of Public Works has promised to make enquiries into the composition of steel rails which have broken upon the State lines during recent frosts. Official returns show that the exports of iron minerals from Belgium last year amounted to only 108,204 tons, or 106,837 tons less than in 1873, and 70,800 tons less than in 1872. The exports of pig from Belgium only amounted last year to 16,137 tons, or 11,000 tons less than in 1873, and 33,000 tons less than in 1872. The exports of rails from Belgium last year were 92,227 tons; this total shows an augmentation of 19,285 tons as compared with 1873, and 10,700 tons as compared with 1872. The exports of plates from Belgium last year amounted to 26,090 tons, showing a gain of 7896 tons as compared with 1873, and one of 2900 tons as compared with 1872. The exports of merchants' iron from Belgium rose last year to 103,800 tons, against 87,600 tons in 1873, and 101,650 tons in 1872. The general exports of iron and pig from Belgium last year were 257,789 tons, or about 20,000 tons less than in 1872, but nearly 30,000 tons more than in 1873. The most important consumers of Belgian iron last year were France, the Low Countries, Italy, and Great Britain; 1000 tons went to China, 700 tons to Egypt, and 750 tons to Chili and Peru. Upon the whole, 1874 would have been a good year for the Belgian iron trade if prices had been more remunerative.

COLLIERIES AND IRONWORKS IN CHINA.

Mr. Henderson, who has passed about 30 years in China, and who is now in England, has been commissioned by the Mandarins in charge of the arsenals of Tien-tsin and Shanghai, in pursuance of instructions from his Excellency Li-hung-chang, Viceroy of the Province of Chihli and Superintendent of Trade for the Northern Treaty Ports, to procure the necessary plant for working the collieries and iron mines, and for smelting and manufacturing iron in that province according to the most approved European methods. He has also been authorised to obtain the services of competent Europeans to direct the works. Attention has been repeatedly directed in the *Times* to the vast coal fields of China, and to the fact that steam coal, quite equal in quality to the best South Wales coal, abounds at Chaitang, in Chihli, about 40 miles west of Peking.

There is not at present a single coal mine in China worked on scientific principles; there is neither steam engine or pump; and the smelting of iron is conducted only in the most primitive manner.

Owing to the high prices which the Chinese are obliged to pay for foreign coal and pig iron—for the latter sometimes as much as 10s. per ton—the authorities have determined to utilise some of their coal fields and deposits of ironstone, which, as well as coal, occurs in great abundance in various provinces of China, and to work them in the most systematic and advantageous manner.

The field which has been selected for commencing operations upon in the first instance is situated at P'ung Ch'ung, near Tre-chow, in the county of Ts'ang-fu, in the southern part of the Province of Chihli, and bordering on the Province of Honan. It would have been impossible to select any locality richer in coal, ironstone, and limestone, or better placed with regard to facility of access. The field is situated on a plateau bordering on and about 300 ft. above the level of the great Plain of Chihli, and distant about 25 miles from some small rivers. Down which the produce of the mines and ironworks will be conveyed to Tien-tsin. To complete the chain of communication it is intended to construct a rail tramway from the mines to one of the rivers in question.

It is proposed, in the first instance, to meet the requirements of the national arsenals; but, as soon as circumstances will permit, manufactured iron of all descriptions will be produced.

In conclusion it may be mentioned, as a notable instance of neglect to utilise national resources, that the very locality in which the authorities are about to commence mining operations is referred to in an ancient Chinese history some 2000 years old, as being the spot where the lost stone was first discovered in China—*Times*.

SMELTING METALS IN CRUCIBLES.—The invention of Messrs. LEVER and COMPANY, of Paris, relates to improvements in the furnaces used in the manufacture of cast-steel and analogous manufacture, and particularly in the relation to the superheating of the air. It consists in the construction and use of a metal superheating apparatus kept at a proper temperature by a continuous

current of air; in the application of this same principle for the preservation of metallurgical furnaces by means of a double casing with circulation of air, which it also superheats; and in the construction of a movable metal bottom or sole-plate to the furnace, by the use of which the crucibles or pots are withdrawn from the furnace promptly, easily, and without any danger.

VALLEYS, AND THEIR RELATION TO FISSIONS, FRACTURES, AND FAULTS.*

Where, as in the case of the consideration of the geological agencies which have contributed to the production of the physical features of our earth's surface, the evidence against or in favour of any given hypothesis is so conflicting it is extremely difficult to determine, when difference of opinion arises, which of the disputants is most entitled to confidence. Much can, no doubt, be said in favour of the theory of subaerial denudation, and, perhaps, almost as much in support of that of meteoric abrasion; and the practical experience, extending over many years, of Mr. Kinahan leads him to adopt a middle course. Formerly he accepted in a great measure the theories of the subaerialists, but he is now of opinion that the different denudants must act in combination; each separately being incapable of doing much work, while not one of the denudants could act efficiently without the aid of external or internal heat to dry and contract the rocks, because to the drying and contraction of the surface rocks is due the minor cracks and joints, and only in conjunction with these shrinkage fissures can any denudant work take effect. Moreover, he continues, we are forced to believe that the faults and breaks due to the shrinkage of the earth's crust have materially assisted in giving the earth its present surface conformation. Few geologists in these countries now give any credit to faults, joints, and the like as having assisted in forming valleys or lake basins, while none give them the prominence to which they appear entitled; but, on the contrary, it has been stated that "there is no necessary connection between fractures and the formation of valleys." It has also been stated that in many cases the materials "washed out of the different valleys could not have been originally softer than the materials of the intervening ridges, as the corresponding strata on the opposite side of the valleys are of equal hardness."

Mr. Kinahan points out that the latter statement quite ignores the fact that if portions of the ground are broken up and loosened in lines by systems of faults or

* "Valleys, and their Relation to Fissions, Fractures, and Faults." By G. H. KINAHAN, M.R.I.A., F.R.G.S.I., Ac., of Her Majesty's Geological Survey. London: Trübner and Co., Ludgate Hill.

joints the intervening parts may be still firm and unbroken, and when the shattered parts are denuded away the others would remain standing in unbroken ridges as how is it, he asks, that it has accomplished in these countries so little work in the glacial period, while the effect of marine denudation in the rearranged drift is so apparent? Many rocks exposed ever since the glacial period to meteoric action have not as yet lost their glacial dressing or stris, while very little of the use in of this continuous denudation can be detected. Abundant evidence in favour of the theory based upon these views is given throughout the book. The first two chapters treat of shrinkage fissures in recent deposits and in the older rocks, and these are followed by others on faults, on the denudants or carvers of the earth's surface, on sea action, ice action, and meteoric abrasion; on the relations between faults, joints, and the formation of valleys, the lake basins of Larnoonagh, gorges, canyons, or without lake basins, the valleys of some of the Irish lakes, gorges, and ravines, the river valleys of the south-west of Ireland—the valley of the Weald and the Kent of Killary Harbour; and on Loch Lomond and other Scotch valleys; whilst the way of appendix, there is a chapter on the formation and growth of soil or surface matter.

Throughout the volume Mr. Kinahan has been careful to furnish indisputable facts in support of every opinion which he advances, and the several plates of illustration given render the statements very readily intelligible; so that, although writing upon a purely scientific question, he has made a book which will be at once interesting and instructive both to the practical geologist and to the general reader.

LEVER'S MINING ALMANAC.—The eighteenth annual edition of Mr. Ellis Lever's handsome sheet almanac has just been issued, and contains the usual summarised statistics which have so long been recognised as useful for comparing the progress made in connection with the several branches of industry referred to. In addition to the usual calendar matter, the sheet contains lists of the Queen's Ministry and its cost; the officers and professors of the Royal School of Mines, the officers of the Geological Society, North of England United Coal Trade Association, Midland Institute of Mining Engineers, Iron and Steel Institute, North of England Institute of Mining and Mechanical Engineers, and Institution of Mechanical Engineers. There are analyses of the colliery operations and coal trade for 1873, of the Bessemer steel manufacture, pig-iron produce, mills and forges, and general summaries of the minerals raised and metals manufactured, and of the uses for which the coal raised was employed. It will thus be seen that the almanac fully maintains its reputation, and is well entitled to a place in every colliery office.

NOVEL PRINCIPLE IN ROCK DRILLS.

The application of steam-power to the tedious and expensive process of drilling or boring in mines is a problem which at present occupies largely the attention of mining engineers. Many patents have been taken out, and numerous machines designed, to expedite the work of the miner, but in the case of some of them the complications or dead weight of the apparatus have prevented them from having the success they deserve.

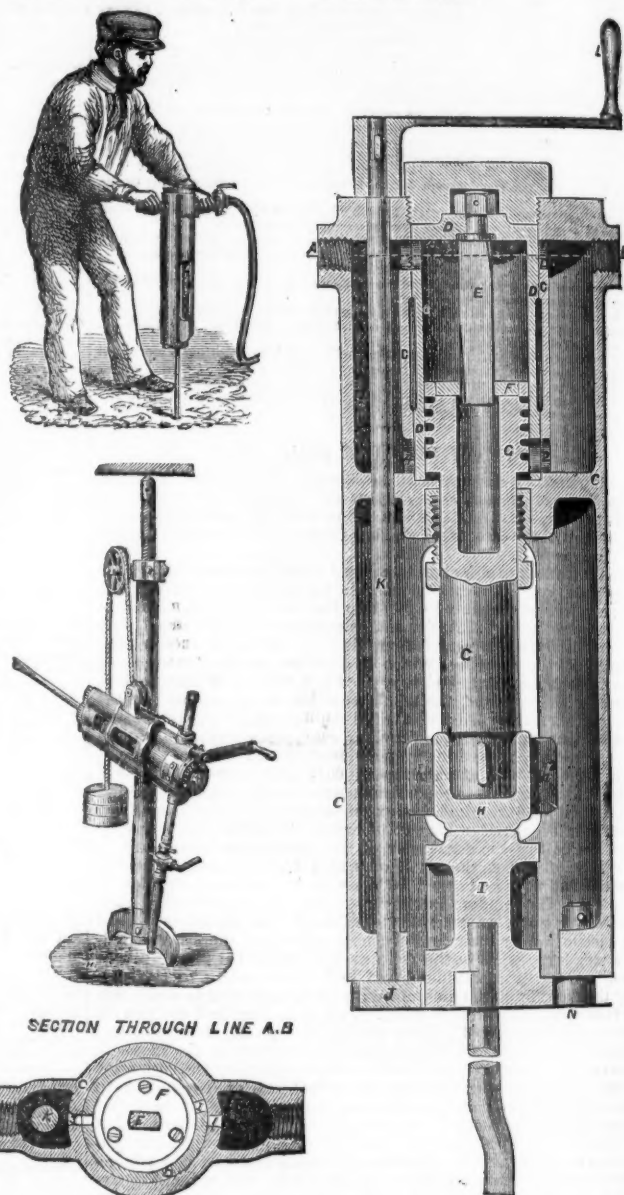
Messrs. TANGEY BROTHERS and RAKE, of Newcastle-on-Tyne, have recently brought out a rock-drill that for lightness, simplicity, and cheapness is believed to supply a want which, owing to the increasing cost of labour, becomes daily more imperative. The accompanying engravings represent the Warsop Rock Drill in two forms, the first suited for sinking mine shafts and for quarrying, and the second for making headings or tunnels. The sinking drill is the simplest form of the machine, and can easily be carried and used by one man. It consists of a small air-propelled hammer in a suitable frame, which strikes a steel socket holding the drilling chisel. The chief peculiarity of the machine being that it imitates closely the process of drilling by hand—the chisel being detached from the piston-rod, and remaining always in the hole. Instead, however, of 40 to 50 blows per minute, this hammer will strike from 500 to 1000. The force of the blow is calculated upon the enduring quality of the steel point of the chisel, and as the hammer has no other duty to perform—such as rotating or feeding the drill—the blows can never exceed the force intended to be applied to the point of the chisel, thus avoiding the frequent breakages to which tools are liable when fastened to a piston-rod, and working backwards and forwards in the hole. The rapidity of the blows also remains the same, whatever may be the depth of the hole to be drilled.

The friction developed by a chisel attached to a reciprocating piston-rod is thought to be often sufficient to absorb nearly all the power available for boring, whereas with the Warsop drill this friction is entirely avoided. The point of the drilling chisel is made like a gouge, having a curve due to the radius of the hole to be drilled. A rib, or mudfeather, projects from the inside towards the centre. This form of point allows the chisel to be rotated when the whole weight of the machine is upon it without grinding off the edge.

In the first illustration a man is represented using the sinking drill. The connection between the chisel and the hammer-frame is precisely similar to that between a ratchet-brace and the drill attached to it, so that by giving the two handles a slight twisting motion the chisel is made to rotate slowly in the hole. Compressed air enters by one handle, while the other serves as an exhaust pipe. As the whole machine rests on the point of the chisel, it descends at a natural rate of progress, varying with the hardness of the rock to be bored. It cannot be forced beyond its capacity, neither can any neglect of the workman prevent it from progressing at the proper rate. The risks of accident or injury are thus reduced to a minimum. A machine so simple as the foregoing is necessarily a cheap one, and may, it is said, with great economy be adopted wherever drilling in stone is necessary.

The second illustration represents the Warsop drill mounted on a pillar or heading stand, for working drifts or tunnels underground. The pillar may be fixed either horizontally or vertically. As the instrument has to be used in all positions, a counterbalance weight is attached to the hammer-frame by means of a cord passing over two pulleys, so that the point of the chisel may always be held close up to the stone while the hammer is at work. In this way the machine shown in the first engraving is made to slide in a sleeve-tube attached to the pillar, and the chisel is rotated by means of a handle at the back of the cylinder, in indirect communication with the socket holding the chisel. By means of the counterbalance weight the progress of the chisel is made to adapt itself to the quality of the rock being bored, and the chisel is saved from accidents due to irregular feeding.

The third illustration represents a section of the hammer frame, showing the method of internal working. C is the cylinder or main body and frame of the machine. An inner cylinder or casing D fits accurately into the cylinder C at its upper part, and this casing is free to partially rotate in the outer cylinder. In the top of the casing D is firmly fixed a twisted bar, E, which may be either flat, square, or a round bar rifled with spiral groove or grooves cut in it. This bar passes through a disc F of steel firmly fixed in the piston or ram G, down the centre of which a hole is bored to receive the full length of twisted bar E. At the opposite end of the piston rod is firmly fixed or cottered a head H having two wings A^1 , A^2 , fitting grooves cast in the frame C, and capable of sliding freely up and down them. The head H is made to rest upon or strike at each blow an anvil or cap I having a recess at its lower part made to receive a drill or chisel. The end of the anvil is formed with a rim around it, against which the end of the main body or frame rests. This base or rim of the anvil I has teeth cut around its periphery, into which gear a smaller toothed wheel J attached to or formed in one piece with the rod K and handle L, in such a manner that by turning the handle L the drill inserted in I will be rotated. The reciprocating action of the piston G is as follows:—In the casing D are formed or cut four narrow longitudinal slots or portways. These slots correspond, one at the top and one at the bottom at the opposite side of the casing, with corresponding portways in the cylinder C, and in such a manner that when the casing is partially turned round one port at the top and one at the opposite side are



SECTION THROUGH LINE A-B

closed and the other two are open. Compressed air is admitted to the cylinder through the opening B, passes alternately through port 2 or 1 into the casing D, forces the piston G up and down, the steam or air escaping or exhausting alternately through ports 3 and 4, and out at the passage A. The partial rotation of D in the cylinder, and consequent regulation of the air to and exhaustion from the interior is effected by the reciprocating motion of the piston—which is prevented from turning round by the wings A^1 , A^2 —causing the bar E to twist, or partially turn backwards and forwards at each stroke in the hole made to receive it in the disc F, the motion given to the bar and casing being greater or less as the twist in the bar is greater or less. By this means the piston G and tap H are made to give a succession of rapid blows on the anvil I, and consequently to the drill point or cutting edge of the tool inserted in the anvil. The drill is constantly being turned round by the handle L, the machine being prevented from turning round by a sleeve or slide M, which is firmly fixed to a tripod or heading stand. There is no striking action in the valve arrangement, which is designed to eliminate all loss from clearance spaces. This simple little tool may be easily carried about by one man, and may be put to work without even having the hole started by hand, as is not uncommon at present.

A drill of this form requires a smaller piston and much less compressed air to drive it than any other machine, having the chisel attached to the piston-rod. A pressure of 16 lbs. per square inch will enable the Warsop drill to do good work, and 20 lbs. is the maximum pressure required in any case. The great loss of power forming ice or freezing the oil used to lubricate the cylinder are entirely avoided. The size and cost of the compressing machines are also correspondingly reduced. This drill has been used on the toughest sandstone without sticking fast even when boring 18 in. per minute, and it has been equally successful in the Mount Sorrell granite, the hardest in Great Britain, which it pierced at the rate of 3 ft. 4 in. per hour, a feat which has never before been performed by any power drill. The weight of the sinking drill in full working order is only 65 lbs.

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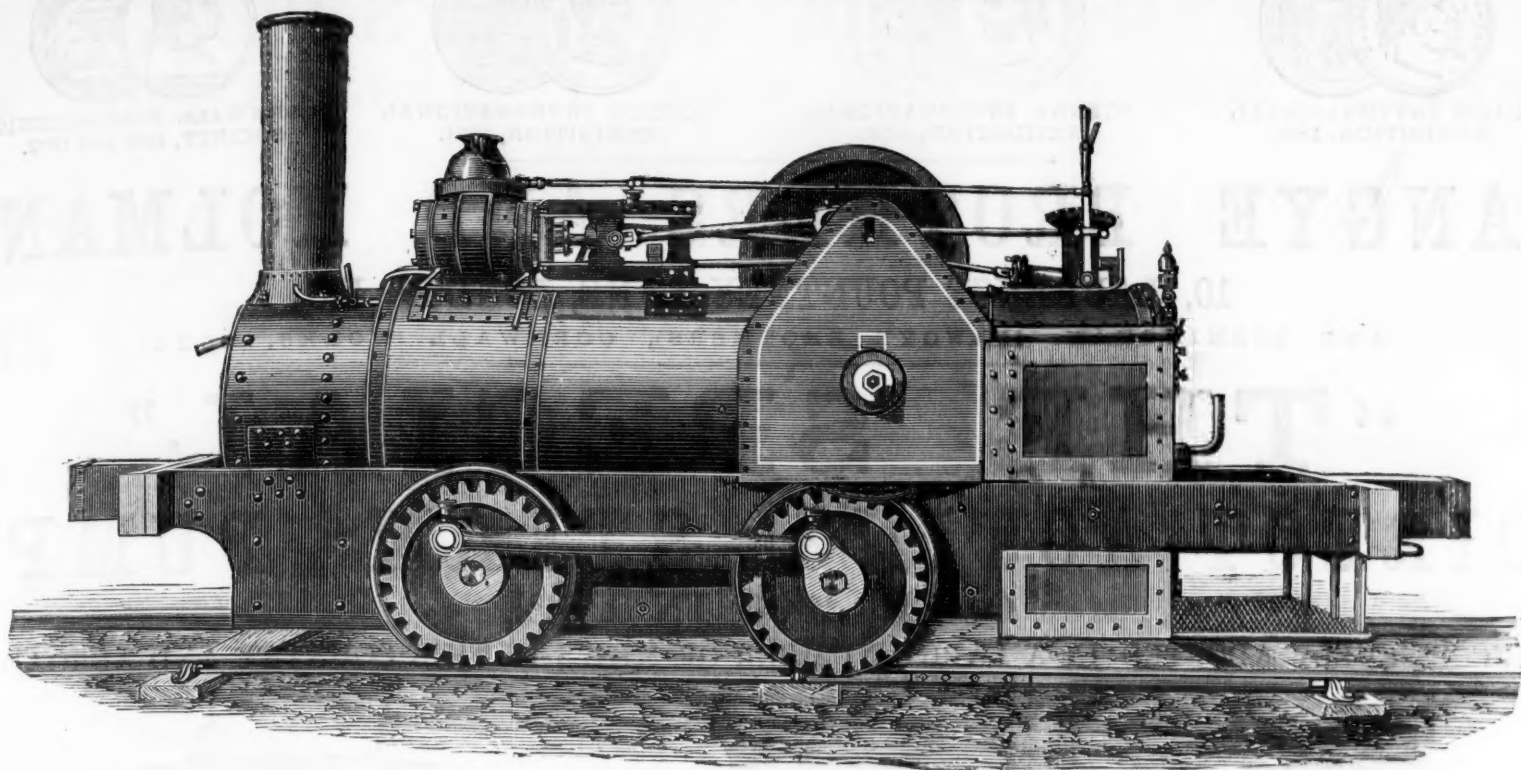
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NEW SMALL GEARED LOCOMOTIVE.



NEW SMALL GEARED LOCOMOTIVE.

The annexed engraving illustrates a small geared locomotive, by Mr. STEPHEN LEWIN, of Poole. The illustration is taken from an engine supplied to the London Lead Mining Company, of Middleton in Teesdale, and used by them on their tramways of 22 in. gauge in the place of horse labour. In their testimony as to the value of

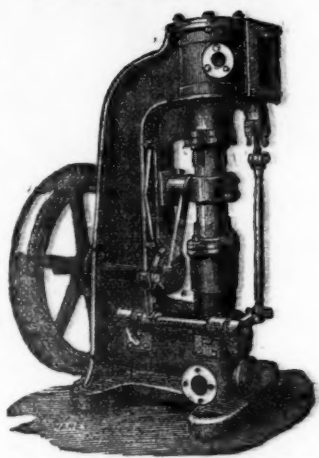
these small engines they say—"As a substitute for horse labour the engine is answering its object most satisfactorily, and we can confidently recommend it for tramway work, and we consider the design and workmanship very good." The engine here referred to is of 2½-horse power nominal, and it weighs loaded ready for work 2 tons 12 cwt. There can be no doubt but that the use of this class of engine must be a very great saving over horse labour, while the

simplicity of the design and the position of the working parts of the engine—removing them from dirt and danger of injury from any obstructions that may lie on the side of the tramway—coupled with the utility of the engines in being able to drive other machinery when not required as a locomotive must lead to their extensive adoption.

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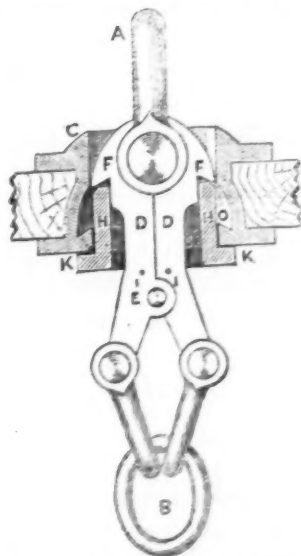
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was working as if nothing had occurred.—From the Northern Echo August 20, 1874.

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PARIS INTERNATIONAL EXHIBITION, 1867.



VIENNA INTERNATIONAL EXHIBITION, 1873.



LONDON INTERNATIONAL EXHIBITION, 1874.

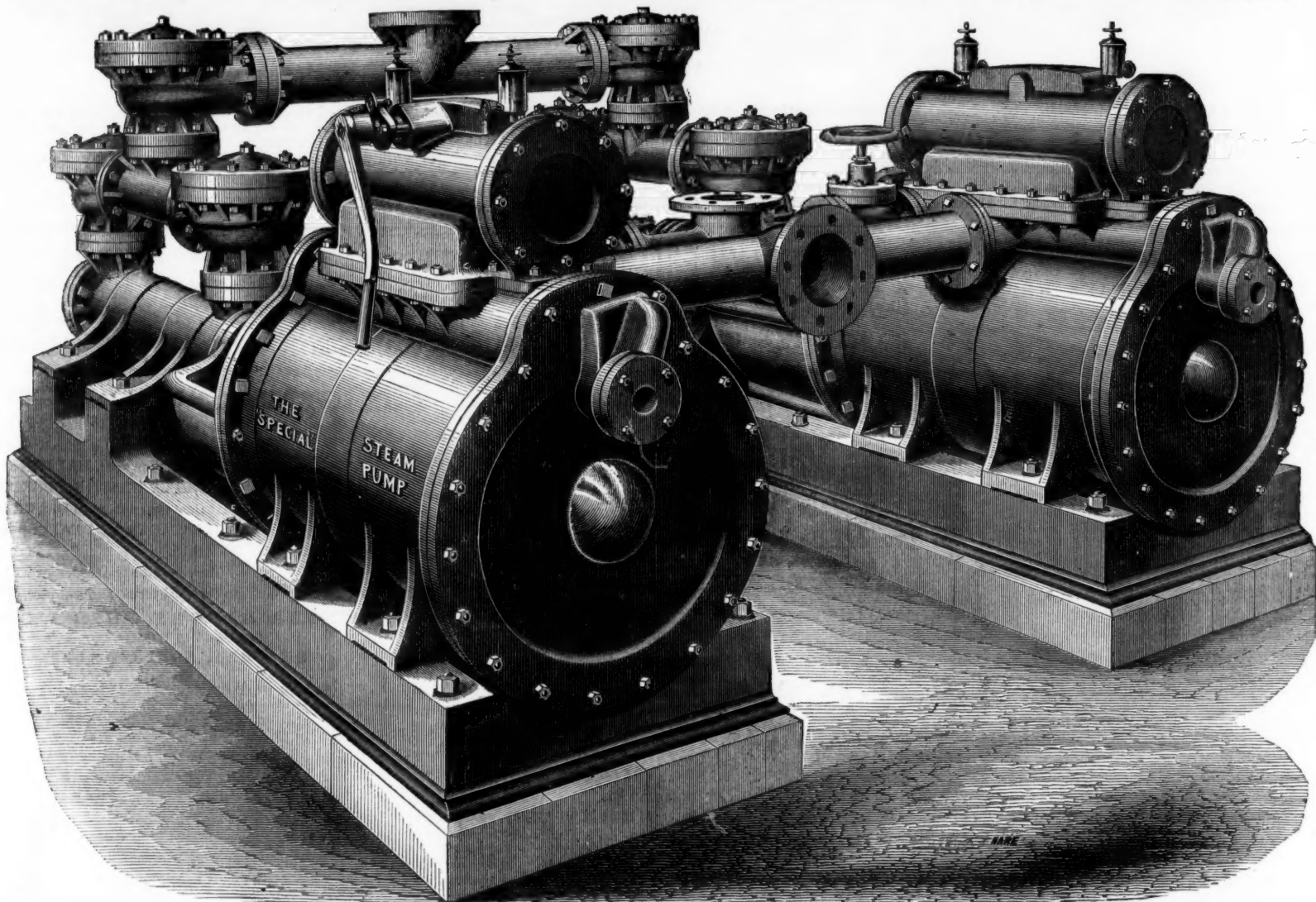


CORNWALL POLYTECHNIC SOCIETY, 1867 and 1873.

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Extract from the Official Report of the Commission of the German Empire on the Vienna Exhibition of 1873, treating on Pumping Engines:—
 “Contrary to these older Pumping Engines exhibited, there is now nearly everywhere the opinion established that the (‘Special’) Pumping Engines placed underground, which are made on A. S. Cameron’s principle, by Messrs. Tangye, are preferable to all. They do much duty, combined with great compactness. They dispense entirely with the troublesome rod arrangement giving often rise to stoppages, so that they will be applied shortly to a great extent, and are already in use in many localities. There is no doubt that this in every respect practical system will command a general adaptation.”

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Diameter of Steam Cylinder	7	8	9	9	10	10	12	12	12	14	14	14	16	16	16	16	18	18	18	18	21	21	21
Ditto of Water Cylinder	3	3	3	4	3	4	3	4	5	4	5	6	4	5	6	7	5	6	7	8	5	6	7
Length of stroke	24	24	24	24	36	24	36	36	36	36	36	36	36	36	36	36	48	36	36	36	48	48	36
Gallons per hour approximate	1830	1830	1830	3250	1830	3250	1830	3250	5070	3250	5070	7330	3250	5070	7330	9750	5070	7330	9750	13,000	5070	7330	9750
Height in feet to which water can be raised with 40 lbs. pressure per sq. in. of steam or compressed air at pump	325	425	540	300	665	375	960	540	345	735	470	330	960	615	426	312	775	540	400	300	1058	740	540

CONTINUED.

Diameter of Steam Cylinder	21	21	21	24	24	24	24	24	26	26	26	26	26	30	30	30	30	30	32	32	32	32	32
Ditto of Water Cylinder	8	9	10	6	7	8	9	10	7	8	9	10	12	8	9	10	12	14	8	9	10	12	14
Length of stroke	36	36	36	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate	13,000	16,519	20,000	7330	9750	13,000	16,519	20,000	9750	13,000	16,519	20,000	30,000	13,000	16,519	20,000	30,000	40,000	13,000	16,519	20,000	30,000	40,000
Height in feet to which water can be raised with 40 lbs. pressure per sq. in. of steam or compressed air at pump	413	326	264	960	700	540	427	345	827	633	500	405	282	840	665	540	375	275	960	758	625	426	313

PRICES OF ABOVE ON APPLICATION.—FOR SIZES AND PRICES OF PUMPS FOR LOWER LIFTS SEE SEPARATE LIST.

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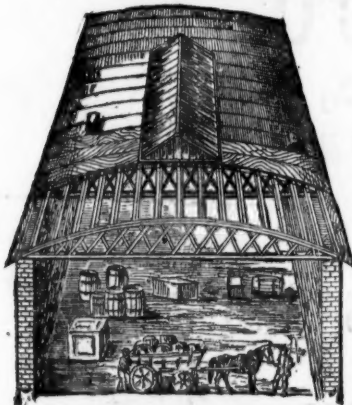
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